BMJ Open

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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-040328
Article Type:	Original research
Date Submitted by the Author:	11-May-2020
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Keywords:	Public health < INFECTIOUS DISEASES, Epidemiology < TROPICAL MEDICINE, EPIDEMIOLOGY, Infection control < INFECTIOUS DISEASES, PUBLIC HEALTH

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Community Perceptions and Practices around COVID-19 in Sierra Leone: a nationwide, cross-sectional survey

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Word count: 2551
Abstract: 299

Abstract

Objectives To assess the public's knowledge, attitudes and practices about the novel coronavirus in Sierra Leone to inform an evidence-based communication strategy around covid-19

Design Nationwide cross-sectional Knowledge, Attitude and Practices (KAP) survey

Setting 56 randomly selected communities in all 14 districts in Sierra Leone

Participants 1253 adults aged 18 years and older

Main outcome measures We calculated proportions of core indicators (awareness, knowledge, risk perception, practices). A composite variable for knowledge (based on 7 variables) was created, and categorised into low (0-2 correct), medium (3-4) and high (5-7). Predictors of knowledge were analysed with multilevel ordinal regression models. Associations between information sources, knowledge and two practices (washing hands with soap and avoiding crowds) were analysed using multilevel logistic regression models.

Results We found that 75% of the respondents felt at moderate or great risk of contracting coronavirus. A majority (65%) did not know you can survive covid-19, 57% had already taken action to avoid infection with the coronavirus, mostly washing hands with soap and water (87%). Radio (73%) was the most used source for covid-19 information, followed by social media (39%). Having a medium or high level of knowledge was associated with higher odds of washing hands with soap (medium knowledge: Adjusted OR 2.1 95% CI 1.0-4.4; high knowledge AOR 4.6 95% CI 2.1-10.2) and avoiding crowds (medium knowledge AOR 2.0 95% CI 1.1-3.6, high knowledge AOR 2.3 95% CI 1.2-4.3).

Conclusions Rapid deployment of KAP surveys can be done in low-income settings, providing input for evidence-based risk communication strategies. In Sierra Leone, where a devastating Ebola outbreak ended over 4 years ago, 65% did not know you can survive covid-19. Information platforms such as radio and social media should be leveraged to disseminate messages by trusted leaders.

Strengths and limitations of this study

- We provide evidence and show the feasibility of a nationwide survey about covid-19 in a low-income country, to inform risk communication strategies in Sierra Leone.
- The response rate of the survey was 99%.
- The study is based on cross-sectional data, so reverse causality cannot be ruled out.

Introduction

The novel coronavirus transformed from a local outbreak into a global pandemic, resulting in millions of people around the world seeing their lives affected, with many suddenly living in quarantine. The virus knows no boundaries and quickly overwhelmed health systems in Italy and Spain and has health authorities in many countries scrambling for health care staff, intensive care beds and personal protective equipment [1,2]. The current number of confirmed coronavirus disease 19 (covid-19) cases are an underestimation, as it only reflects the testing capacity of countries [3].

While high-income countries are struggling to contain the virus, using unprecedented measures such as strict lockdowns of the whole society, the virus has also spread to low- and middle-income countries [4]. With weaker health systems and overcrowded living conditions, measures such as social distancing, frequent hand washing and lockdowns have a different meaning. In Africa, a partnership between the African Union, Africa CDC, WHO and African nations led to the formation of the Africa Taskforce for Coronavirus Preparedness and Response (AFTCOR), to support diagnostics, surveillance, infection prevention and control and communication [5]. Border closures across the world and flight restrictions form logistical problems in delivering essential goods to Africa [6].

In Sierra Leone, memories of the devastating Ebola epidemic that ravaged the country between 2014 and 2016 are still fresh in people's minds. Not only did almost 4000 people die from Ebola, it is likely that many more people died due to the collapsed health system over the course of the outbreak [7,8]. Many lessons were learned from curbing the outbreak, such as the importance of community engagement, which can potentially help in mitigating the current pandemic [9–11].

The current state of the pandemic is similar to the start of the Ebola outbreak in West Africa: with the lack of a vaccine or a cure, widespread behaviour change of the general public is needed to slow and stop the spread of the virus. Social distancing and frequent hand washing are among the main actions an individual can take to prevent infection with the novel coronavirus [12,13].

As part of the preparedness for covid-19 cases in Sierra Leone, we measured the level of knowledge and uptake of preventive practices through a nationwide Knowledge, Attitudes and Practices (KAP) survey. Results formed the basis for further development and production of an evidence-based communication strategy around covid-19 in collaboration with the Ministry of Health and Sanitation (MoHS). At the time of the survey (March 16-25, 2020), there were no confirmed covid-19 cases in Sierra Leone. The first lab-confirmed case in the country was reported on March 31st.

Methods

We administered a cross-sectional, nationwide survey in Sierra Leone. We used a multi-stage cluster sampling design with primary sampling units selected with probability relative to their size. The list of around 1200 peripheral health units (PHUs) formed the sampling frame for the selection of enumeration areas. Sierra Leone is divided into 14 districts; 4 PHUs were randomly selected from each district. In each of the selected PHUs, a random sample of 25 households from the PHU's catchment population was selected and a resident aged 18 years or older was randomly selected for an interview. The households were selected using a random walk method; in the approximate centre of the sampled community a pen would be thrown in the air. The tip of the pen indicated the sampling direction. A skip interval was determined in advance and was derived from dividing the number of estimated households in the community by the required sample size. Enumerators would walk in the direction of the tip of the pen, counting and selecting households according to the skip interval. Data was captured on 4G enabled tablets using Open Development Kit (ODK). The 14 experienced enumerators received a 2-day training before the start of the data collection, practicing the

translations of the questionnaire into local languages and getting familiarised with the tablet. The target sample size of 1400 individuals was set to produce national estimates at a 95% confidence level with a margin of error of +/- 3.5%.

Whereas we did not directly include Patient and Public Involvement in the design of the study, the tools used in this survey were similar to previously deployed KAP surveys in the Ebola outbreak in Sierra Leone [14], results of which were widely disseminated during the course of the outbreak and updated based on public feedback. The survey was updated to reflect covid-19. It contained a mix of closed-ended 'yes/no' questions and open ended questions, after which the enumerator would tick the corresponding answer on a predefined list on the tablet. A composite variable was created for knowledge, based on 7 variables. Three of those variables related to the modes of transmission of covid-19, a further 3 related to the main symptoms and 1 question asked about the possibility of surviving covid-19. Depending on the number of correct answers, respondents could score between 0-7. The knowledge score was categorized into 0-2 correct answers (low), 3-4 (medium) and 5-7 (high). The two preventive practice questions (washing your hand with soap and water more often and avoiding crowds) were answered only by respondents who indicated that they had taken action to avoid infection with covid-19.

Statistical analysis

Due to the sampling strategy, there was an overrepresentation of the Northern and Eastern Province, this was adjusted for using sampling weights based on population sizes of the four regions of Sierra Leone. We summarized the demographic data and calculated proportions with their 95% Confidence Intervals of the core indicators (awareness, risk perception, knowledge, practices and information sources). Predictors of the 3-level knowledge variable were analysed using multilevel ordinal regression models, adjusted for the geographic clusters on the first level. We specified crude and models adjusted for region (North, West, South, East), gender (male/female), age (18-29, 30-39, 40-49, 50-59, 60+), education (no formal education, primary, secondary and above) and religion (Islam/Christianity). Results were reported in Odds Ratios and their 95% Confidence Intervals. Associations with preventive practices (hand washing with soap and water and avoiding crowds) were analysed using multilevel logistic regression models, adjusted for the abovementioned covariates. Data was analysed using StataMP 15. The Sierra Leone Research and Scientific Review Committee granted ethical permission for this KAP study.

Results

The overall response rate of the KAP survey was 99%, yielding a total sample size of 1399. Due to missing variables, 146 participants (10%) were excluded, bringing the sample size for the analysis to 1253. The distribution across the 4 regions reflect the number of districts per region; the Northern Province contains 5 districts as opposed to 2 districts in the Western Area. More than half of the sample (58%) was between 18 and 39 years old and 52% had at least secondary education, see table 1.

The awareness of the novel coronavirus was high, with 91% (95% Confidence Interval (CI) 88.2% - 93.2%) indicating that they had heard of covid-19 (table 2). 75% (95% CI 64.7 - 82.5%) of the sample felt at moderate or great risk of contracting the virus in the next 6 months, but this varied greatly across regions; 96% in the Eastern province felt at moderate

or high risk compared to 58% in the Western Area (where capital Freetown is located). Knowledge about how the virus spreads was relatively high (61%-74%), however knowledge about important symptoms of covid-19 such as difficulty breathing was relatively low (33%, 95% CI 24.8% - 41.9%). Only 35% (95% CI 28.5% - 41.3%) knew that you can survive covid-19. A bit more than half of the respondents (57%, 95% CI 50.9% - 63.0%) said they have already taken action to avoid covid-19 infection. The most commonly mentioned action taken was washing hands with soap and water more often (87%, 95% CI 81.9% - 90.5%). Radio (73%, 95% CI 69.2% - 77.2%) was the most used source for covid-19 information, followed by social media (39%, 95% CI 31.4% - 46.%3). Print media (11%, 95% CI 5.9% - 18.3%) and traditional leaders (9%, 95% CI 4.4% - 17.2%) were the least commonly reported sources of covid-19 information. 93% of respondents indicated that they would like to have more information on covid-19, mostly about signs and symptoms of the disease and ways to prevent it.

Respondents who felt at moderate or high risk of contracting covid-19 were more likely to have a higher level of knowledge (Adjusted Odds Ratio (AOR) 2.82 95% CI 1.84-4.32), see table 3. Those living in the Northern and Southern Province were more likely to have more knowledge about the novel coronavirus. Men were 45% (95% CI 1.13-1.86) more likely than women to demonstrate knowledge. Respondents who attained at least secondary education were 3 times more likely (95% CI 2.22-4.22) than respondents with no formal education to have more knowledge about covid-19.

Respondents who had a medium level of knowledge about the novel coronavirus were 2 times more likely to say that they wash their hands with water and soap more often (AOR 2.10 95% CI 1.00-4.39); those with a high level of knowledge were more than 4 times more likely to say so (AOR 4.60 95% CI 2.08-10.18), see table 4. A similar pattern can be observed for the association between knowledge and the self-reported practice of avoiding crowds. Having a medium or high level of knowledge was associated with avoiding crowds (medium knowledge: AOR 1.95 95% CI 1.07-3.57, high knowledge: AOR 2.30 95% CI 1.23-4.30).

All information sources, apart from community meetings were associated with increased knowledge about covid-19, see table 5. However, only radio was significantly associated with a higher likelihood of reporting more frequent hand washing with water and soap (AOR 2.64 95% CI 1.40-4.95). Three information sources were associated with avoiding crowds; social media (AOR 1.90 95% CI 1.20-3.01), print media (AOR 3.52 95% CI 1.57-7.90) and the Ministry of Health and Sanitation (AOR 2.88 95% CI 1.28-6.47).

Discussion

This cross-sectional nationwide survey in Sierra Leone gives insights in the knowledge and practices around covid-19. Whereas at the time of the study there were no confirmed cases in Sierra Leone, awareness of covid-19 was high – likely due to the ongoing worldwide health emergency. There was a strong demand for more information among the respondents. We found strong associations between increased knowledge and important preventive practices such as frequent hand washing with soap and water and avoiding crowds. Various demographic variables were associated with increased knowledge, indicating that outbreak communication should specifically target women and those with lower educational levels. The results of this study were used to upgrade the communication strategies of the MoHS and national organizations in Sierra Leone. Key messages targeting women, young people

and across various platforms are currently being developed. Use of mass media is being intensified and trusted leaders such as religious leaders and traditional healers are being engaged to disseminate standardized messages. Measures are being developing to track and debunk rumours, especially via social media.

The perception of risk of contracting covid-19 was relatively high. Whereas covid-19 has a mortality rate that is much lower than Ebola, risk perceptions of covid-19 were higher than reported in a similar KAP survey during the first months of the Ebola outbreak, when 58% felt they were at some of risk of contracting Ebola [14]. The ongoing pandemic elsewhere in the world and the memories of the devastating Ebola outbreak have likely exacerbated the perception of risk [15]. The finding that only 35% of the respondents knew that you can survive covid-19, shows that more sensitization needs to be done so that risk perceptions reflect the actual risk. For instance, messages could highlight that older age groups (70 years and older) are most at risk of experiencing a severe form of covid-19 and of dying from the disease [16]. While in many European countries the share of those aged 70 and older is between 15-20% [17], in Sierra Leone only 2.4% of the population is older than 70 [18]. Exact age-specific mortality rates of covid-19 are to date not confirmed but are significantly lower than Ebola [19,20].

Radio has throughout the Ebola outbreak been an important source of information [14,21]. In our study, radio is similarly the most cited source of information. Community sources such as religious and traditional leaders were mentioned by only 10% of the sample, which is low compared to the Ebola outbreak when 60% heard messages through community leaders [21]. This can be explained by the timing of our survey; sensitisation and community engagement efforts were just starting. Community leaders remain trusted sources of information in Sierra Leone and should be targeted [22].

Social media on the other hand was also a relatively frequently mentioned source in our study. WhatsApp is an especially widespread social media platform in many African countries [23]. In our study, social media was strongly associated with increased knowledge and with avoiding crowds. Whereas it can clearly be a source of relevant information, there is also reportedly widespread misinformation circulating quickly on WhatsApp [24]. We have not studied misconceptions and risk behaviour further, which are likely to be associated with social media. Monitoring and frequent updates on social media should be a priority in any communication strategy [25]. Radio and social media provide platforms that could be leveraged to disseminate important information [26].

While a little more than half of the respondents indicated that they had already taken actions to avoid covid-19 infection, the feasibility of (long-term) preventive practices in low-income settings should be taken into account [27]. Social distancing in overcrowded communities can be very challenging. Most deprived communities lack running water, toilet facilities, soap and basic food items. It is not uncommon to find a family of 4-5 people cramped in a single bedroom with poor lighting and ventilation [28]. Promoting social distancing should be aligned with the on-the-ground reality. Increasing public education, especially on the use of face masks and the provision of water and soap might be the most realistic measure to take.

Strengths & limitations

Major strengths of this study are the nationwide sample and high response rate. This study shows that rapid data collection can be done in preparation for a health emergency and can form the basis of evidence-based decision making. This is a cross-sectional survey, so associations can also be interpreted in the opposite direction. The sampling strategy (using PHUs as the sampling frame), caused oversampling of some regions compared to population size, which was adjusted for by applying sampling weights. Still, the data may not have been representative of the population. Social desirability might have influenced the answers of respondents. Respondents might have highlighted preventive practices that they were familiar with from the Ebola outbreak – which might make the implementation of public health measures quicker. Lastly, self-reported practices might be different from actual practices.

Conclusion

Rapid deployment of knowledge, attitude and practice surveys can be done in low-income settings with minimal resources, providing input for evidence-based risk communication strategies. In Sierra Leone, where a devastating Ebola outbreak ended over 4 years ago, we found that while awareness and risk perception of covid-19 was high, the majority does not know that one can survive covid-19. Knowledge was associated with preventive practices such as hand washing with soap and water and avoiding crowds. Information platforms such as radio and social media should be leveraged to disseminate messages by trusted leaders.

Contributors

PS, MBJ, NW, IN, TS, HT led the conception and design of the survey. PS, MBJ, NW, IN contributed to the training and supervision of the data collection teams. MW led the data analysis with support from PS and HN. All co-authors contributed to the interpretation of the results. PS, HN, MW contributed to the writing of the manuscript. All co-authors read and approved the manuscript.

Data sharing

All requests to access the data must be processed through the multipartner data sharing mechanism. All data accessibility requests should be directed to the corresponding author: maike.winters@ki.se

Role of the funding source

There was no external funding.

Conflict of Interest

The authors declare no conflict of interest

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Table 1 Demographics

	Eastern Province	Northern Province	Southern Province	Western Area	Total
Sex					
Female	133 (47)	221 (47)	181 (52)	89 (47)	604 (48)
Male	127 (53)	254 (53)	165 (48)	102 (53)	648 (52)
Age (years)					
<20	27 (11)	43 (9)	41 (12)	13 (7)	124 (10)
20-29	55 (23)	138 (29)	58 (17)	66 (35)	317 (25)
30-39	57 (24)	117 (25)	69 (20)	50 (26)	293 (23)
40-49	46 (19)	83 (17)	57 (16)	36 (19)	222 (18)
50-59	26 (11)	62 (13)	48 (14)	16 (8)	152 (12)
>=60	28 (12)	32 (7)	73 (21)	10 (5)	143 (11)
Education					
No formal	79 (33)	154 (32)	131 (38)	40 (21)	404 (32)
Primary	39 (16)	58 (12)	73 (21)	19 (10)	189 (15)
Secondary	120 (50)	263 (55)	140 (41)	132 (69)	655 (52)
Religion					
Islam	145 (61)	378 (80)	229 (66)	91 (48)	843 (67)
Christianity	94 (39)	97 (20)	117 (34)	100 (52)	408 (33)

Table 2. Covid-19 awareness, knowledge, practices and information sources

Indicator	**%***	**95% CI***
Awareness & attitudes		
Heard of covid-19	91	88.2 to 93.2
Moderate – great risk perception	75	64.7 to 82.5
Knowledge		
Mode of transmission: air	61	54.6 to 66.1
Mode of transmission: body fluids	74	68.3 to 78.8
Mode of transmission: touch	66	59.4 to 71.2
Symptoms: fever	38	30.0 to 46.4
Symptoms: cough	54	47.5 to 61.3
Symptoms: difficulty breathing	33	24.8 to 41.9
Possible to survive covid-19	35	28.5 to 41.3
Practices		
Taken any action	57	50.9 to 63.0
Wash hands with soap & water	87	81.9 to 90.5
Avoid crowded places	62	53.7 to 69.0
Drink traditional herbs	9	3.7 to 21.6
Medicines from pharmacy	10	4.0 to 22.1

Drink a lot of water / juice	22	14.0 to 31.8
Information sources		
Social media	39	31.4 to 46.3
Radio	73	69.2 to 77.2
Church/Mosque	24	17.3 to 31.7
Community meetings	18	11.8 to 26.7
Print media	11	5.9 to 18.3
Traditional leaders	9	4.4 to 17.2
Ministry of Health and Sanitation	13	7.5 to 20.6
*Adjusted for sampling weights		

Table 3 Predictors of covid-19 knowledge

	Crude OR (95% CI)	p-value	Adjusted* OR (95% CI)	p-value
Risk perception				
No & small	Reference	-	Reference	-
Moderate & great	3.56 (2.04-6.25)	0.000	2.82 (1.84-4.32)	0.000
Region				
East	Reference	-	Reference	-
North	3.54 (1.14-10.96)	0.029	3.05 (1.05-8.86)	0.040
South	7.78 (2.71-22.30)	0.000	10.84 (3.52-33.39)	0.000
Western	4.14 (1.99-8.62)	0.000	3.65 (0.89-14.98)	0.072
Sex				
Female	Reference	-	Reference	-
Male	1.65 (1.27-2.14)	0.000	1.45 (1.13-1.86)	0.003
Age				
18-29	Reference	-	Reference	-
30-39	0.96 (0.66-1.39)	0.808	1.42 (1.02-1.99)	0.040
40-49	0.89 (0.58-1.38)	0.605	1.45 (1.01-2.09)	0.043
50-59	0.67 (0.40-1.11)	0.119	1.06 (0.70-1.62)	0.774
>60	0.57 (0.32-1.00)	0.051	0.80 (0.51-1.23)	0.298
Education				
No formal	Reference	-	Reference	-
Primary	1.78 (1.00-3.18)	0.050	1.39 (0.95-2.03)	0.090
Secondary	3.32 (2.11-5.21)	0.000	3.06 (2.22-4.22)	0.000
Religion				
Islam	Reference	-	Reference	-
Christianity	1.77 (1.24-2.52)	0.002	1.38 (1.02-1.85)	0.035
*Adjusted for: risk perception, region, sex, age, education, religion				

Table 4 Association between knowledge and practices

	Handwashing			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Knowledge				
Low	Reference	-	Reference	-
Medium	1.84 (0.91-3.73)	0.089	2.10 (1.00-4.39)	0.049
High	4.63 (2.18-9.84)	0.000	4.60 (2.08-10.18)	0.000
	Avoiding crowds			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Knowledge				
Low	Reference	-	Reference	-
Medium	1.86 (1.03-3.36)	0.039	1.95 (1.07-3.57)	0.030
High	2.21 (1.21-4.02)	0.010	2.30 (1.23-4.30)	0.009
*Adjusted for: region, sex, age, education, religion				

Table 5 Association between information sources and knowledge and preventive practices

	Knowledge			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	3.78 (2.66-5.38)	0.000	2.97 (2.12-4.16)	0.000
Radio	1.93 (1.40-2.66)	0.000	1.75 (1.26-2.43)	0.001
Church / Mosque	1.72 (1.21-2.44)	0.003	1.87 (1.30-2.70)	0.001
Community meetings	1.41 (0.89-2.34)	0.144	1.53 (0.95-2.48)	0.080
Print media	2.79 (1.42-5.47)	0.004	2.63 (1.34-5.17)	0.006
Traditional leaders	1.98 (1.17-3.35)	0.012	2.04 (1.13-3.70)	0.019
MoHS	3.09 (1.84-5.19)	0.000	3.13 (1.85-5.30)	0.000
	Hand washing			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	1.03 (0.55-1.93)	0.935	0.79 (0.37-1.68)	0.537

Radio	2.72 (1.46-5.05)	0.002	2.64 (1.40-4.95)	0.003
Church / Mosque	1.88 (0.87-4.07)	0.108	1.76 (0.83-3.71)	0.135
Community meetings	2.73 (1.23-6.05)	0.015	2.03 (0.85-4.90)	0.110
Print media	3.54 (0.80-15.68)	0.094	2.91 (0.62-13.60)	0.171
Traditional leaders	1.66 (0.49-5.68)	0.411	1.58 (0.52-4.85)	0.415
MoHS	2.26 (0.71-7.18)	0.164	1.96 (0.55-6.96)	0.289
	Avoiding crowds			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	1.65 (1.04-2.60)	0.032	1.90 (1.20-3.01)	0.007
Radio	1.64 (1.02-2.65)	0.042	1.59 (0.97-2.61)	0.064
Church / Mosque	1.69 (0.93-3.04)	0.082	1.62 (0.88-2.98)	0.117
Community meetings	1.49 (0.82-2.70)	0.191	1.56 (0.84-2.91)	0.156
Print media	3.29 (1.55-6.99)	0.002	3.52 (1.57-7.90)	0.003
Traditional leaders	3.21 (0.91-11.30)	0.068	3.33 (0.87-12.71)	0.077
MoHS	2.70 (1.27-5.76)	0.011	2.88 (1.28-6.47)	0.011
*Adjusted for: risk perception, region, sex, age, education, religion				

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4
Bias	9	Describe any efforts to address potential sources of bias	4
Study size	10	Explain how the study size was arrived at	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	4
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	4
		(*b*) Describe any methods used to examine subgroups and interactions	4
		(*c*) Explain how missing data were addressed	4
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	4
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	4,5
		(b) Give reasons for non-participation at each stage	5
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	5
		(b) Indicate number of participants with missing data for each variable of interest	5
Outcome data	15*	Report numbers of outcome events or summary measures	5 (tables 1-2)

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	5 (tables 3-5)
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	6,7
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	7
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	6,7
Generalisability	21	Discuss the generalisability (external validity) of the study results	6,7
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	8

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Community Knowledge, Perceptions and Practices around COVID-19 in Sierra Leone: a nationwide, cross-sectional survey

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-040328.R1
Article Type:	Original research
Date Submitted by the Author:	24-Jul-2020
Complete List of Authors:	Sengeh, Paul; FOCUS1000, Research and Evaluation Jalloh, Mohammad; FOCUS1000, Office of the Chief Executive Officer Webber, Nance; FOCUS1000, Communications Programme Ngobeh, Ibrahim; FOCUS1000, Research and Evaluation Samba, Thomas; Sierra Leone Ministry of Health and Sanitation Thomas, Harold; Sierra Leone Ministry of Health and Sanitation Nordenstedt , Helena; Karolinska Institutet, Department of Global Public Health Winters, Maike ; Karolinska Institutet, Department of Global Public Health
Primary Subject Heading:	Global health
Secondary Subject Heading:	Communication, Epidemiology, Infectious diseases, Public health
Keywords:	Public health < INFECTIOUS DISEASES, Epidemiology < TROPICAL MEDICINE, EPIDEMIOLOGY, Infection control < INFECTIOUS DISEASES, PUBLIC HEALTH

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Community Knowledge, Perceptions and Practices around COVID-19 in Sierra Leone: a nationwide, cross-sectional survey

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Word count: 3010
Abstract: 296

Abstract

Objectives To assess the public's knowledge, attitudes and practices about the novel coronavirus in Sierra Leone to inform an evidence-based communication strategy around covid-19

Design Nationwide cross-sectional Knowledge, Attitude and Practices (KAP) survey

Setting 56 randomly selected communities in all 14 districts in Sierra Leone

Participants 1253 adults aged 18 years and older of which 52% were men

Main outcome measures We calculated proportions of core indicators (awareness, knowledge, risk perception, practices). A composite variable for knowledge (based on 7 variables) was created, and categorised into low (0-2 correct), medium (3-4) and high (5-7). Predictors of knowledge were analysed with multilevel ordinal regression models. Associations between information sources, knowledge and two practices (washing hands with soap and avoiding crowds) were analysed using multilevel logistic regression models.

Results We found that 75% of the respondents felt at moderate or great risk of contracting coronavirus. A majority (70%) of women did not know you can survive covid-19, compared to 61% of men. 60% of men and 54% of women had already taken action to avoid infection with the coronavirus, mostly washing hands with soap and water (87%). Radio (73%) was the most used source for covid-19 information, followed by social media (39%). Having a medium or high level of knowledge was associated with higher odds of washing hands with soap (medium knowledge: Adjusted OR 2.1 95% CI 1.0-4.4; high knowledge AOR 4.6 95% CI 2.1-10.2) and avoiding crowds (medium knowledge AOR 2.0 95% CI 1.1-3.6, high knowledge AOR 2.3 95% CI 1.2-4.3).

Conclusions This study shows that in the context of covid-19 in Sierra Leone, there is a strong association between knowledge and practices. Because the knowledge gap differs between genders, regions, educational levels and age, it is important that messages are specifically targeted to these core audiences.

Strengths and limitations of this study

- We provide evidence and show the feasibility of a nationwide survey about covid-19 in a low-income country, to inform risk communication strategies in Sierra Leone.
- The response rate of the survey was 99%.
- The study is based on cross-sectional data, so reverse causality cannot be ruled out.

Introduction

The novel coronavirus transformed from a local outbreak into a global pandemic, resulting in millions of people around the world seeing their lives affected, with many suddenly living in quarantine. The virus knows no boundaries and quickly overwhelmed health systems in Italy and Spain in March 2020 [1] and has health authorities in many countries scrambling for health care staff, intensive care beds and personal protective equipment [2,3]. The current number of confirmed coronavirus disease 19 (covid-19) cases are an underestimation, as it only reflects the testing capacity of countries [4].

While high-income countries are struggling to contain the virus, using unprecedented measures such as strict lockdowns of the whole society, the virus has also spread to low- and middle-income countries [5]. With weaker health systems and overcrowded living conditions, measures such as physical distancing and lockdowns have a different meaning, whereby lost income, increased food prices and less access to non-covid health services can have dire consequences both in the short and in the long term [6]. In Africa, a partnership between the African Union, Africa CDC, WHO and African nations led to the formation of the Africa Taskforce for Coronavirus Preparedness and Response (AFTCOR), to support diagnostics, surveillance, infection prevention and control and communication [7]. Border closures across the world and flight restrictions form logistical problems in delivering essential goods to many African countries [8].

In Sierra Leone, memories of the devastating West-African Ebola epidemic that ravaged the country between 2014 and 2016 are still fresh in people's minds. Not only did almost 4000 people die from Ebola, it is likely that many more people died due to the collapsed health system over the course of the outbreak [9,10]. Many lessons were learned from curbing the outbreak, such as the importance of community engagement, which can potentially help in mitigating the current pandemic [11–13]. During the Ebola outbreak, radio was the most important source of information in Sierra Leone [14]. Trusted community members such as traditional and religious leaders would use radio as a platform to reach their followers, and interactive programming allowed for a dialogue between listeners and radio makers [15,16].

The current state of the pandemic is similar to the start of the Ebola outbreak in West Africa: with the lack of a vaccine or a cure, widespread behaviour change of the general public is needed to slow and stop the spread of the virus. Physical distancing and frequent hand washing are among the main actions an individual can take to prevent infection with the novel coronavirus [17,18].

As part of the preparedness for covid-19 cases in Sierra Leone, we measured the level of knowledge and uptake of preventive practices through a nationwide Knowledge, Attitudes and Practices (KAP) survey. Results formed the basis for further development and production of an evidence-based communication strategy around covid-19 in collaboration with the Ministry of Health and Sanitation (MoHS).

Methods

We administered a cross-sectional, nationwide survey in Sierra Leone between March 16-25, 2020. At the time of the survey, there were no confirmed covid-19 cases in Sierra Leone. The first lab-confirmed case in the country was reported on March 31st. We used a multi-stage cluster sampling design with primary sampling units selected with probability relative to their size. The list of around 1200 peripheral health units (PHUs) formed the sampling frame for the selection of enumeration areas. Sierra Leone is divided into 14 districts; 4 PHUs were randomly selected from each district. In each of the selected PHUs, a random sample of 25 households from the PHU's catchment population was selected and a resident aged 18 years or older was randomly selected for an interview. The households were selected using a random walk method; in the approximate centre of the sampled community a pen would be thrown in the air. The tip of the pen indicated the sampling direction. A skip interval was

determined in advance and was derived from dividing the number of estimated households in the community by the required sample size. Enumerators would walk in the direction of the tip of the pen, counting and selecting households according to the skip interval. Enumerators, wearing identity badges from the Sierra Leonean non-governmental organization FOCUS1000, explained the study to the targeted participant, after which informed consent was obtained. Enumerators were instructed to immediately stop an interview if a participant showed covid-19 symptoms or indicated during the survey to have symptoms. The enumerator would encourage the participant to seek care immediately. Consent and the further data collection were captured on 4G enabled tablets using Open Data Kit (ODK). The 14 experienced enumerators received a 2-day training before the start of the data collection, practicing the translations of the questionnaire into local languages and getting familiarised with the tablet. The multi-lingual numerators were district-based staff from FOCUS1000 and dispatched to areas that corresponded to their language skills. The study and training were organised by FOCUS1000. The target sample size of 1400 individuals was set to produce national estimates at a 95% confidence level with a margin of error of +/- 3.5%.

Whereas we did not directly include Patient and Public Involvement in the design of the study, the tools used in this survey were similar to previously deployed KAP surveys in the Ebola outbreak in Sierra Leone [14], results of which were widely disseminated during the course of the outbreak and updated based on public feedback. The survey was updated to reflect covid-19. It contained a mix of closed-ended 'yes/no' questions and open ended questions, after which the enumerator would tick the corresponding answer on a predefined list on the tablet. A composite variable was created for knowledge, based on 7 variables (see supplementary material for the full questionnaire). Three of those variables related to closed-ended questions about the modes of transmission of covid-19 (e.g. 'Can the coronavirus disease be transmitted through the air?'). A further 3 variables related to an open-ended question about the main symptoms ('What are some of the signs and symptoms of someone infected with the coronavirus disease?'), whereby the enumerator would not read the alternatives out loud, but tick the boxes that corresponded to the answers of the participants. Finally, a closed-ended question asked about the possibility of surviving covid-19. Depending on the number of correct answers, respondents could score between 0-7. The knowledge score was categorized into 0-2 correct answers (low), 3-4 (medium) and 5-7 (high). The two preventive practice questions (washing your hand with soap and water more often and avoiding crowds) were answered only by respondents who indicated that they had taken action to avoid infection with covid-19.

Statistical analysis

Due to the sampling strategy, there was an overrepresentation of the Northern and Eastern Province, this was adjusted for by using sampling weights based on population sizes of the four regions of Sierra Leone. We summarized the demographic data and calculated proportions with their 95% Confidence Intervals of the core indicators (awareness, risk perception, knowledge, practices and information sources) for the overall sample as well as by gender. Predictors of the 3-level knowledge variable were analysed using multilevel ordinal regression models, adjusted for the geographic clusters on the first level. We specified crude and models adjusted for region (North, West, South, East), gender (male/female), age (18-29, 30-39, 40-49, 50-59, 60+), education (no formal education,

primary, secondary and above) and religion (Islam/Christianity). Results were reported in Odds Ratios and their 95% Confidence Intervals. Associations with preventive practices (hand washing with soap and water and avoiding crowds) were analysed using multilevel logistic regression models, adjusted for the abovementioned covariates. Data was analysed using StataMP 15. The Sierra Leone Research and Scientific Review Committee granted ethical permission for this KAP study, see supplementary material.

Results

The overall response rate of the KAP survey was 99%, yielding a total sample size of 1399. Due to missing variables, 146 participants (10%) were excluded, bringing the sample size for the analysis to 1253. The distribution across the 4 regions reflect the number of districts per region; the Northern Province contains 5 districts as opposed to 2 districts in the Western Area. More than half of the sample (58%) was between 18 and 39 years old and 52% had at least secondary education, see table 1.

The awareness of the novel coronavirus was high, with 91% (95% Confidence Interval (CI) 88.2% - 93.2%) indicating that they had heard of covid-19 (table 2). 75% (95% CI 64.7 - 82.5%) of the sample felt at moderate or great risk of contracting the virus in the next 6 months, but this varied greatly across regions; 96% in the Eastern province felt at moderate or high risk compared to 58% in the Western Area (where capital Freetown is located). Knowledge about how the virus spreads was relatively high (61%-74%), however knowledge about important symptoms of covid-19 such as difficulty breathing was relatively low (33%, 95% CI 24.8% - 41.9%). Only 35% (95% CI 28.5% - 41.3%) knew that you can survive covid-19. This differed significantly by gender, whereby more men (39%, 95% CI 31.7% - 46.9%) knew about covid-19 survival than women (30%, 95% CI 23.8% to 36.5%), see supplementary material. A bit more than half of the respondents (57%, 95% CI 50.9% - 63.0%) said they have already taken action to avoid covid-19 infection. More men than women reported doing so (men: 60%, 95% CI 52.9% - 66.4% vs women: 54% 95% CI 47.4% - 60.6%). The most commonly mentioned action taken was washing hands with soap and water more often (87%, 95% CI 81.9% - 90.5%). Radio (73%, 95% CI 69.2% - 77.2%) was the most used source for covid-19 information, followed by social media (39%, 95% CI 31.4% - 46.%3). Social media use was significantly more common by men (45%, 95% CI 37.9% - 52.9%) than by women (31%, 95% CI 23.6% - 39.9%). Print media (11%, 95% CI 5.9% - 18.3%) and traditional leaders (9%, 95% CI 4.4% - 17.2%) were the least commonly reported sources of covid-19 information. 93% of respondents indicated that they would like to have more information on covid-19, mostly about signs and symptoms of the disease and ways to prevent it.

Respondents who felt at moderate or high risk of contracting covid-19 were more likely to have a higher level of knowledge (Adjusted Odds Ratio (AOR) 2.82 95% CI 1.84-4.32), see table 3. Those living in the Northern and Southern Province were more likely to have more knowledge about the novel coronavirus. Men were 45% (95% CI 1.13-1.86) more likely than women to demonstrate knowledge. Respondents who attained at least secondary education were 3 times more likely (95% CI 2.22-4.22) than respondents with no formal education to have more knowledge about covid-19.

Respondents who had a medium level of knowledge about the novel coronavirus were 2 times more likely to say that they wash their hands with water and soap more often (AOR

2.10 95% CI 1.00-4.39); those with a high level of knowledge were more than 4 times more likely to say so (AOR 4.60 95% CI 2.08-10.18), see table 4. A similar pattern can be observed for the association between knowledge and the self-reported practice of avoiding crowds. Having a medium or high level of knowledge was associated with avoiding crowds (medium knowledge: AOR 1.95 95% CI 1.07-3.57, high knowledge: AOR 2.30 95% CI 1.23-4.30).

All information sources, apart from community meetings were associated with increased knowledge about covid-19, see table 5. However, only radio was significantly associated with a higher likelihood of reporting more frequent hand washing with water and soap (AOR 2.64 95% CI 1.40-4.95). Three information sources were associated with avoiding crowds; social media (AOR 1.90 95% CI 1.20-3.01), print media (AOR 3.52 95% CI 1.57-7.90) and the Ministry of Health and Sanitation (AOR 2.88 95% CI 1.28-6.47).

Discussion

This cross-sectional nationwide survey in Sierra Leone gives insights in the knowledge, attitudes and practices around covid-19. Whereas at the time of the study there were no confirmed cases in Sierra Leone, awareness of covid-19 was high – likely due to the ongoing worldwide health emergency. There was a strong demand for more information among the respondents. We found strong associations between increased knowledge and important preventive practices such as frequent hand washing with soap and water and avoiding crowds. Significant gender differences in knowledge and taking preventive actions indicate that outbreak communication should specifically target women, as well as those with lower educational levels. Furthermore, the Southern Province differed significantly from the other provinces in terms of their level of knowledge about covid-19. It can be speculated that this difference might be due the relatively high exposure to media (such as radio and mobile phones) in the Southern Province and the presence of a university, which might have brought more awareness to the ongoing pandemic [19].

The results of this study were used to upgrade the communication strategies of the MoHS and national organizations in Sierra Leone. Key messages targeting women, young people and across various platforms are currently being developed. Use of mass media is intensified and trusted leaders such as religious leaders and traditional healers are engaged to disseminate standardized messages. Measures are developed to track and debunk rumours, especially via social media.

The perception of risk of contracting covid-19 was relatively high – higher than reported in a similar KAP survey during the first months of the Ebola outbreak, when 58% felt at risk of contracting Ebola [14]. Whereas Ebola's mortality rate is estimated to be around 50% among confirmed cases [20], covid-19 has a much lower case fatality rate of around 4.1% [21]. Given the substantial underreporting of covid-19 cases, the true infection fatality rate is likely much lower. The ongoing pandemic elsewhere in the world and the memories of the devastating Ebola outbreak have likely exacerbated the perception of risk [22]. The finding that only 35% of the respondents knew that you can survive covid-19, shows that more sensitization needs to be done so that risk perceptions reflect the actual risk. For instance, messages could highlight that older age groups (70 years and older) are most at risk of experiencing a severe form of covid-19 and of dying from the disease [23]. While in many European countries the share of those aged 70 and older is between 15-20% [24], in Sierra

Leone only 2.4% of the population is older than 70 [25]. Exact age-specific mortality rates of covid-19 are to date not confirmed but are significantly lower than Ebola [26,27].

Radio has throughout the Ebola outbreak been an important source of information [14,28]. In our study, radio is similarly the most cited source of information. Community sources such as religious and traditional leaders were mentioned by only 10% of the sample, which is low compared to the Ebola outbreak when 60% heard messages through community leaders [28]. This can be explained by the timing of our survey; sensitisation and community engagement efforts were just starting. Community leaders remain trusted sources of information in Sierra Leone and should be mobilised for community engagement [29].

Social media on the other hand was also a relatively frequently mentioned source in our study. WhatsApp is an especially widespread social media platform in many African countries [30]. In our study, social media was strongly associated with increased knowledge and with avoiding crowds. Whereas it can clearly be a source of relevant information, there is also reportedly widespread misinformation circulating quickly on WhatsApp [31]. We have not studied misconceptions and risk behaviour further, which are likely to be associated with social media. Monitoring and frequent updates on social media should be a priority in any communication strategy [32]. Radio and social media provide platforms that could be leveraged to disseminate important information [33].

While a little more than half of the respondents indicated that they had already taken actions to avoid covid-19 infection, the feasibility of (long-term) preventive practices in low-income settings should be taken into account [34]. Physical distancing in overcrowded communities can be very challenging. Most deprived communities lack running water, toilet facilities, soap and basic food items. It is not uncommon to find a family of 4-5 people cramped in a single bedroom with poor lighting and ventilation [35]. Promoting physical distancing should be aligned with the on-the-ground reality. Increasing public education, especially on the use of face masks and the provision of water and soap might be the most realistic measure to take.

Strengths & limitations

Major strengths of this study are the nationwide sample and high response rate. This study shows that rapid data collection can be done in preparation for a health emergency and can form the basis of evidence-based decision making. This is a cross-sectional survey, so associations can also be interpreted in the opposite direction. The sampling strategy (using PHUs as the sampling frame), caused oversampling of some regions compared to population size, which was adjusted for by applying sampling weights. Still, the data may not have been representative of the population. Social desirability might have influenced the answers of respondents. Respondents might have highlighted preventive practices that they were familiar with from the Ebola outbreak – which might make the implementation of public health measures quicker. Despite extensive practice of the translations of the English questionnaire to local languages, the translations in practice might not have been fully consistent. Lastly, self-reported practices might be different from actual practices.

Conclusion

In Sierra Leone, where a devastating Ebola outbreak ended over 4 years ago, we found that while awareness and risk perception of covid-19 was high, the majority does not know that one can survive covid-19. While knowledge does not automatically translate into practices, this study shows that in the context of covid-19 in Sierra Leone, there is a strong association between knowledge and practices. Although we cannot rule out reverse causality, this points to the importance of community engagement and risk communication. Because the knowledge gap differs between genders, regions, educational levels and age, it is important that messages are specifically targeted to these core audiences. Information platforms with a wide reach, such as radio and social media, should be leveraged to disseminate messages by trusted leaders.

Contributors

PS, MBJ, NW, IN, TS, HT led the conception and design of the survey. PS, MBJ, NW, IN contributed to the training and supervision of the data collection teams. MW led the data analysis with support from PS and HN. All co-authors contributed to the interpretation of the results. PS, HN, MW contributed to the writing of the manuscript. All co-authors read and approved the manuscript.

Data sharing

All requests to access the data must be processed through the multipartner data sharing mechanism. All data accessibility requests should be directed to the corresponding author: maike.winters@ki.se

Role of the funding source

There was no external funding.

Conflict of Interest

The authors declare no conflict of interest

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Table 1 Demographics

	Eastern Province	Northern Province	Southern Province	Western Area	Total
Sex					
Female	133 (47)	221 (47)	181 (52)	89 (47)	604 (48)
Male	127 (53)	254 (53)	165 (48)	102 (53)	648 (52)
Age (years)					
<20	27 (11)	43 (9)	41 (12)	13 (7)	124 (10)
20-29	55 (23)	138 (29)	58 (17)	66 (35)	317 (25)
30-39	57 (24)	117 (25)	69 (20)	50 (26)	293 (23)
40-49	46 (19)	83 (17)	57 (16)	36 (19)	222 (18)
50-59	26 (11)	62 (13)	48 (14)	16 (8)	152 (12)
>=60	28 (12)	32 (7)	73 (21)	10 (5)	143 (11)
Education					
No formal	79 (33)	154 (32)	131 (38)	40 (21)	404 (32)
Primary	39 (16)	58 (12)	73 (21)	19 (10)	189 (15)
Secondary	120 (50)	263 (55)	140 (41)	132 (69)	655 (52)
Religion					
Islam	145 (61)	378 (80)	229 (66)	91 (48)	843 (67)
Christianity	94 (39)	97 (20)	117 (34)	100 (52)	408 (33)

Table 2. Covid-19 awareness, knowledge, practices and information sources

Indicator	**%***	**95% CI***
Awareness & attitudes		
Heard of covid-19	91	88.2 to 93.2
Moderate – great risk perception	75	64.7 to 82.5
Knowledge		
Mode of transmission: air	61	54.6 to 66.1
Mode of transmission: body fluids	74	68.3 to 78.8
Mode of transmission: touch	66	59.4 to 71.2
Symptoms: fever	38	30.0 to 46.4
Symptoms: cough	54	47.5 to 61.3
Symptoms: difficulty breathing	33	24.8 to 41.9
Possible to survive covid-19	35	28.5 to 41.3
Practices		
Taken any action	57	50.9 to 63.0
Wash hands with soap & water	87	81.9 to 90.5
Avoid crowded places	62	53.7 to 69.0
Drink traditional herbs	9	3.7 to 21.6
Medicines from pharmacy	10	4.0 to 22.1

Drink a lot of water / juice	22	14.0 to 31.8
Information sources		
Social media	39	31.4 to 46.3
Radio	73	69.2 to 77.2
Church/Mosque	24	17.3 to 31.7
Community meetings	18	11.8 to 26.7
Print media	11	5.9 to 18.3
Traditional leaders	9	4.4 to 17.2
Ministry of Health and Sanitation	13	7.5 to 20.6
*Adjusted for sampling weights		

Table 3 Predictors of covid-19 knowledge

	Crude OR (95% CI)	p-value	Adjusted* OR (95% CI)	p-value
Risk perception				
No & small	Reference	-	Reference	-
Moderate & great	3.56 (2.04-6.25)	0.000	2.82 (1.84-4.32)	0.000
Region				
East	Reference	-	Reference	-
North	3.54 (1.14-10.96)	0.029	3.05 (1.05-8.86)	0.040
South	7.78 (2.71-22.30)	0.000	10.84 (3.52-33.39)	0.000
Western	4.14 (1.99-8.62)	0.000	3.65 (0.89-14.98)	0.072
Sex				
Female	Reference	-	Reference	-
Male	1.65 (1.27-2.14)	0.000	1.45 (1.13-1.86)	0.003
Age				
18-29	Reference	-	Reference	-
30-39	0.96 (0.66-1.39)	0.808	1.42 (1.02-1.99)	0.040
40-49	0.89 (0.58-1.38)	0.605	1.45 (1.01-2.09)	0.043
50-59	0.67 (0.40-1.11)	0.119	1.06 (0.70-1.62)	0.774
>60	0.57 (0.32-1.00)	0.051	0.80 (0.51-1.23)	0.298
Education				
No formal	Reference	-	Reference	-
Primary	1.78 (1.00-3.18)	0.050	1.39 (0.95-2.03)	0.090
Secondary	3.32 (2.11-5.21)	0.000	3.06 (2.22-4.22)	0.000
Religion				
Islam	Reference	-	Reference	-
Christianity	1.77 (1.24-2.52)	0.002	1.38 (1.02-1.85)	0.035
*Adjusted for: risk perception, region, sex, age, education, religion				

Table 4 Association between knowledge and practices

	Handwashing			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Knowledge				
Low	Reference	-	Reference	-
Medium	1.84 (0.91-3.73)	0.089	2.10 (1.00-4.39)	0.049
High	4.63 (2.18-9.84)	0.000	4.60 (2.08-10.18)	0.000
	Avoiding crowds			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Knowledge				
Low	Reference	-	Reference	-
Medium	1.86 (1.03-3.36)	0.039	1.95 (1.07-3.57)	0.030
High	2.21 (1.21-4.02)	0.010	2.30 (1.23-4.30)	0.009
*Adjusted for: region, sex, age, education, religion				

Table 5 Association between information sources and knowledge and preventive practices

	Knowledge			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	3.78 (2.66-5.38)	0.000	2.97 (2.12-4.16)	0.000
Radio	1.93 (1.40-2.66)	0.000	1.75 (1.26-2.43)	0.001
Church / Mosque	1.72 (1.21-2.44)	0.003	1.87 (1.30-2.70)	0.001
Community meetings	1.41 (0.89-2.34)	0.144	1.53 (0.95-2.48)	0.080
Print media	2.79 (1.42-5.47)	0.004	2.63 (1.34-5.17)	0.006
Traditional leaders	1.98 (1.17-3.35)	0.012	2.04 (1.13-3.70)	0.019
MoHS	3.09 (1.84-5.19)	0.000	3.13 (1.85-5.30)	0.000
	Hand washing			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	1.03 (0.55-1.93)	0.935	0.79 (0.37-1.68)	0.537

Radio	2.72 (1.46-5.05)	0.002	2.64 (1.40-4.95)	0.003
Church / Mosque	1.88 (0.87-4.07)	0.108	1.76 (0.83-3.71)	0.135
Community meetings	2.73 (1.23-6.05)	0.015	2.03 (0.85-4.90)	0.110
Print media	3.54 (0.80-15.68)	0.094	2.91 (0.62-13.60)	0.171
Traditional leaders	1.66 (0.49-5.68)	0.411	1.58 (0.52-4.85)	0.415
MoHS	2.26 (0.71-7.18)	0.164	1.96 (0.55-6.96)	0.289
	Avoiding crowds			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	1.65 (1.04-2.60)	0.032	1.90 (1.20-3.01)	0.007
Radio	1.64 (1.02-2.65)	0.042	1.59 (0.97-2.61)	0.064
Church / Mosque	1.69 (0.93-3.04)	0.082	1.62 (0.88-2.98)	0.117
Community meetings	1.49 (0.82-2.70)	0.191	1.56 (0.84-2.91)	0.156
Print media	3.29 (1.55-6.99)	0.002	3.52 (1.57-7.90)	0.003
Traditional leaders	3.21 (0.91-11.30)	0.068	3.33 (0.87-12.71)	0.077
MoHS	2.70 (1.27-5.76)	0.011	2.88 (1.28-6.47)	0.011
*Adjusted for: risk perception, region, sex, age, education, religion				

Supplementary Material

Community Knowledge, Perceptions and Practices around COVID-19 in Sierra Leone: a nationwide, cross-sectional survey

S1: Core indicators by gender

Indicator	Sex	
	Male % (95% CI)	Female % (95% CI)
Moderate – great risk perception	75 (66.6 to 82.6)	74 (61.6 to 82.9)
Knowledge		
Mode of transmission: air	63 (55.1 to 69.5)	58 (52.6 to 63.7)
Mode of transmission: body fluids	77 (71.0 to 81.9)	71 (64.5 to 76.2)
Mode of transmission: touch	67 (59.4 to 74.0)	64 (57.5 to 70.9)
Symptoms: fever	39 (31.2 to 47.1)	37 (27.7 to 46.9)
Symptoms: cough	56 (49.0 to 62.3)	53 (44.4 to 61.5)
Symptoms: difficulty breathing	34 (26.1 to 43.3)	31 (22.6 to 41.4)
Possible to survive covid-19	39 (31.7 to 46.9) *	30 (23.8 to 36.5)*
Practices		
Taken any action	60 (52.9 to 66.4)*	54 (47.4 to 60.6)*
Wash hands with soap & water	87 (82.1 to 91.1)	86 (79.6 to 90.8)
Avoid crowded places	61 (52.9 to 69.1)	62 (52.8 to 70.7)
Drink traditional herbs	10 (4.0 to 22.4)	9 (3.1 to 21.6)
Medicines from pharmacy	10 (4.3 to 22.7)	9 (3.5 to 22.0)
Drink a lot of water / juice	21 (13.4 to 32.4)	22 (14.1 to 32.2)
Information sources		
Social media	45 (37.9 to 52.9)*	31 (23.6 to 39.9)*
Radio	74 (69.7 to 78.7)	72 (66.9 to 77.0)
Church/Mosque	23 (17.0 to 30.2)	25 (17.0 to 34.4)
Community meetings	18 (12.2 to 26.1)	18 (10.8 to 28.2)

Print media	10 (5.9 to 17.0)	11 (5.6 to 20.4)
Traditional leaders	8 (4.3 to 15.4)	10 (4.3 to 19.8)
Ministry of Health and Sanitation	11 (6.8 to 18.6)	14 (7.8 to 23.5)
** Chi2 <0.05 All proportions are adjusted for sampling weights		

Consent Statement

Hello. My name is _____.

I am working with FOCUS 1000 – an NGO in Sierra Leone that works to improve the health of children, women, and their communities. We are conducting a quick assessment of the public's perceptions, knowledge, attitudes, and behaviours, relating to the prevention of Coronavirus disease (COVID-19). The information we collect will help us, the Government of Sierra Leone, Development Partners, and civil society organizations better educate the public about how to effectively prevent the transmission of the disease.

The interview will take about 20 minutes. All of the information you share with us will be kept confidential – meaning that we will not link your name in any reports or identify you as the respondent in any other way. Your participation in this study is voluntary, and you will not be paid. You may choose to stop the interview at any point or refuse to answer questions you do not feel comfortable responding to. There are no right or wrong responses. Therefore, we encourage you to be honest and truthful in your responses so that we can accurately understand the current situation on-the-ground.

ASK TO RESPONDENT:

- Do you have any questions?
- Do I have your permission to continue with the interview?

1. YES I AGREE → Continue with interview

2. NO I DECLINE → END interview; respectfully thank participant for their time

By signing below, I attest that I have read the above statement to the participant and he/she has agreed to continue with the interview. I have also addressed all of his/her questions and/or concerns.

SIGNATURE OF INTERVIEWER: ……

DATE (Day, Month, Year): /____/____/____/

QUESTIONNAIRE

Enumerator Identification

Enumerator ID:	Supervisor Initials (QA/QC):

District and Chiefdom Identification

Western Area _____ Western Rural _____ Western Urban **Northern Province** _____ Bombali _____ Falaba _____Koinadugu _____ Tonkolili **North Western Province** _____ Kambia _____Karina _____Port Loko _____ **Eastern Province** _____ Kailahun _____ Kenema _____ Kono **Southern Province** _____ Bo _____ Bonthe _____ Moyamba _____ Pujehun	**Name of Community** _____ **Household #:**_____ _____ **Household size**:_____ _____

1. **Have you heard of the Coronavirus disease (COVID-19) before** (prior to this interview)**?**
   a. Yes
   b. No (if selected, end survey here)
   c. No response
2. If yes, **through what means/ways did you learn about the Coronavirus disease (COVID-19)? (select all applicable choices)**
   a. Radio (FM 98.1, AYV radio, SLBC Morning Coffee, Television
   b. Megaphone public announcements
   c. Social media (SMS, WhatsApp, Internet, Blog, Website, Facebook, Twitter, etc.)
   d. Church / Mosque / other religious venues
   e. Other community meetings
   f. Civil Society Organizations (FOCUS 1000, etc.)
   g. Newspaper / Flyers / Brochures / Other print materials
   h. Traditional leaders (chief, village headman, etc.)
   i. Ministry of Health and Sanitation / Well Bodi Ministry and other gov't MDAs
   j. Community health workers (CHWs)
   k. From family members or friends
   l. Others_____
   m. I don't know / not sure
   n. No Response

RISK PERCEPTION

3. **What level of risk do you think you have in getting Coronavirus disease (COVID-19) in the next 6 months? (read choices; select one)**
   a. No risk —> GO TO Q6
   b. Small risk
   c. Moderate risk
   d. Great risk
   e. I don't know / not sure
   f. No Response

4. **Why do you believe that you are at risk? (select all applicable choices; DO NOT read)**
   a. I have been experiencing signs and symptoms of Coronavirus disease (COVID-19) since _____ day(s) ago
      (if so: stop the interview, recommend that the person goes to the nearest health facility to check the health status for possible case of Coronavirus disease (COVID-19)
   b. I have not been keeping well lately
   c. I was already affected by EVD and not been keeping well since
   d. I have other challenging health conditions (HIV, Diabetes, hypertension, etc.)
   e. The disease is in over xx countries and already in West Africa
   f. A lot of Salone traders go to China, Chinese go back and forth from this country, we have students returning from there

g. Others_____
h. I don't know / not sure
i. No Response

GO TO → Q7

5. **Why do you believe that you are NOT at risk? (select all applicable choices; DO NOT read)**
   a. I do not eat or hunt bush meat or bats
   b. I am a clean person / Coronavirus disease (COVID-19) only affects unclean people
   c. I don't live in an area where there is Coronavirus disease (COVID-19)
   d. I don't come in contact with someone with Coronavirus disease (COVID-19)
   e. God is protecting me
   f. I avoid unprotected contact with bodily fluids
   g. I wash my hands with soap or other disinfectants
   h. I did not get EVD the last time
   i. Others_____
   j. I don't know / not sure/
   k. No Response

KNOWLEDGE / ATTITUDES

6. **What causes the Coronavirus disease (COVID-19)? (select all applicable choices; DO NOT read)**
   a. Virus
   b. Bats / Monkeys / Chimpanzees / Other wild animals
   c. God or higher power
   d. Witchcraft
   e. Evildoing / Sin
   f. Curse
   g. Others _____
   h. I don't know/ not sure
   i. No Response

7. **How does a person get the Coronavirus disease (COVID-19)? (select all applicable choices; DO NOT read)**
   a. By air
   b. Bad odor or smell
   c. Preparing bush meat as a meal (such as chimpanzees, monkeys, and other wild animals)
   d. Eating bush meat
   e. Saliva or cough of an infected person
   f. Body fluids of an infected person
   g. Feces of an infected person
   h. Shaking the hands of an infected person
   i. Other physical contact with an infected person

j. God's will
k. Witchcraft
l. Making contact with anything someone sick with Coronavirus disease (COVID-19) has touched
m. Others _____
n. I don't know / not sure
o. No Response

8. Can the Coronavirus disease (COVID-19) be transmitted through the air?

a. Yes
b. No
c. I don't know / not sure
d. No Response

9. Can I prevent myself from getting the Coronavirus disease (COVID-19) by avoiding contact with blood and body fluids (cough, saliva, sweat, tears, runny nose)?

a. Yes
b. No
c. I don't know / not sure
d. No Response

10. Can people help protect themselves from the Coronavirus disease (COVID-19) by not touching anyone else?

a. Yes
b. No
c. I don't know / not sure
d. No Response

11. What are some of the signs and symptoms of someone infected with the Coronavirus disease (COVID-19)? (select all applicable choices; DO NOT read)

a. Any Fever
b. Sweat
c. Sudden onset of high fever
d. Severe headache
e. Persistent cough
f. Sore throat
g. Rash
h. Difficulty breathing
i. Others_____
j. I don't know / not sure
k. No Response

12. Do you know or have you heard that it is possible for someone to survive and recover from Coronavirus disease (COVID-19)?

a. Yes
b. No
c. I don't know / not sure
d. No Response

13. If a person has a suspected Coronavirus disease (COVID-19) does he/she have a higher chance of survival if he/she goes immediately to a Health Facility?

a. Yes
b. No
c. I don't know / not sure
d. No Response

14. If a person with the Coronavirus disease (COVID-19) goes immediately to a Health Facility will he/she reduce the chance of spreading it to other family members, work colleagues or friends?

a. Yes
b. No
c. I don't know / not sure
d. No Response

15. Would you like to have more information on the Coronavirus disease (COVID-19)?

a. Yes
b. No → Q22
c. I don't know / not sure
d. No Response

16. What area(s) do you need additional information on? (select all applicable choices; DO NOT read)

a. Cause / origin of the disease
b. Signs and symptoms of the disease
c. Ways to prevent the disease
d. Medical care and treatment options for those with the disease
e. Home-based care for someone who is sick and suspected to have Coronavirus disease (COVID-19)
f. How to protect others in the house if a household member is suspected of the Coronavirus disease (COVID-19)
g. Support and care for those quarantined to their houses because they have been exposed to Coronavirus disease (COVID-19)

h. Support and care for those quarantined in health facilities because they have been exposed to the Coronavirus disease (COVID-19)
i.
j. Others_____
k. I don't know / not sure
l. No Response

BEHAVIOUR

17. Since you heard of the Coronavirus disease (COVID-19), have you taken any action to avoid being infected?

a. Yes
b. No →22
c. I don't know / can't remember →22
d. No Response→22

18. In what ways have you changed your behavior or taken actions to avoid being infected? (select all applicable choices; DO NOT read)

a. I wash my hands with soap and water more often
b. I wash my hands with just water more often
c. I clean my hands with other disinfectants more often
d. I try to avoid crowded places
e. I drink a lot of water / juice
f. I drink traditional herbs (e.g. gbangbah)
g. I take medicines from pharmacies
h. I have bought and I am using face masks

20. If a family member became sick and died tomorrow, would you touch or wash the dead body?

a. Yes
b. No
c. I don't know
d. No response

21. If a family member dies of the Coronavirus disease (COVID-19), would you touch or wash the dead body?

a. Yes
b. No
c. I don't know
d. No response

SOCIO-DEMOGRAPHIC

22. Gender _____Male Female_____

23. **Age:**_____ years

24. **What is you highest level of education?**
    a. No formal education
    b. Some primary school
    c. Completed primary school
    d. Completed Junior Secondary School (JSS)
    e. Completed Senior Secondary School (SSS)
    f. Completed Diploma / Postsecondary Training
    g. Completed Bachelors
    h. Completed Masters / Doctorate
    i. No Response

25. **What kind of work do you currently do?**
    a. Private business (excluding petty traders)
    b. Plumber / Carpenter / Electrician
    c. Petty Trader
    d. Farmer
    e. Teacher / lecturer /Instructor
    f. Public transportation driver (taxi, buses, podapoda)
    g. Okada rider
    h. Medical or health professional
    i. Other Government employee (not already listed above)
    j. Student
    k. Unemployed
    l. No Response

26. **What is your religion?**
    a. Islam
    b. Christianity
    c. Other_____
    d. I don't hold any religious beliefs
    e. No Response

CLOSING SCRIPT

- Thank you for taking the time to discuss these important issues with me.
- Again, please be rest assured that your responses will be kept confidential.
- Your name or any other identifiers of your family or household will not be included in the report.
- The responses you have provided would help in improving social mobilization efforts aiming to help contain the Coronavirus disease (COVID-19) epidemic in Sierra Leone
- Once again, thank you very much.

DO YOU HAVE ANY QUESTIONS FOR ME?

If you have additional questions, please contact FOCUS 1000
Name: Mr. Paul A. Sengeh

Phone number: 076626543

GOVERNMENT OF SIERRA LEONE
Office of the Sierra Leone Ethics and Scientific Review Committee
Directorate of Training and Research
5th Floor, Youyi Building Brookfields, Freetown
Ministry of Health and Sanitation

11th March, 2020

To: **Mohamed B Jalloh** **Principal Investigator**
Chief Executive Officer
Focus 1000
7E Conteh Drive, Tengbeh Town
Freetown
mbjalloh@focus1000.org

Study Title: **Knowledge, Attitudes and Practices: How Ready are Primary Health Units to Prevent and Control Coronavirus (COVID-19) Infection in Sierra Leone?**

Version: 3rd March, 2020

Collaborators:

- Institute for Governance Reform, SL
- Ministry of Finance, SL
- Directorate of Science, Technology and Innovation, SL
- Massachusetts Institute of Technology, USA

Submission Type: First protocol version submitted for review

Committee Action: Expedited Review

Approval Date: 11th March, 2020

The Sierra Leone Ethics and Scientific Review Committee (SLESRC) having conducted an expedited review of the above study protocol and determined that it presents minimal risk to subjects, **hereby grants ethical and scientific approval for it to be conducted in Sierra Leone.** The approval is valid for the period, **11 March, 2020 – 10 September, 2020.** It is your responsibility to obtain re-approval/extension for any on-going research prior to its expiration date. The request for re-approval/extension must be supported by a progress report.

For further enquiries please contact: efoday@health.gov.sl

GOVERNMENT OF SIERRA LEONE
Office of the Sierra Leone Ethics and Scientific Review Committee
Directorate of Training and Research
5th Floor, Youyi Building Brookfields, Freetown
Ministry of Health and Sanitation

Review Comments:

- **Amendments:** Intended changes to the approved protocol such as the informed consent documents, study design, recruitment of participants and key study personnel, must be submitted for approval by the SLESRC prior to implementation.

- **Termination of the study:** When study procedures and data analyses are fully complete, please inform the SLESRC that you are terminating the study and submit a brief report covering the protocol activities. Individual identifying information should be destroyed unless there is sufficient justification to retain, approved by the SLESRC. All findings should be based on de-identified aggregate data and all published results in aggregate or group form. A copy of any publication be submitted to the SLESRC for its archive.

- ***While the Committee is aware that the country has not registered a COVID-19 case yet, ensure you provide hand sanitizers to enumerators who will be using public transport and other public fora, and train them to maintain social distance***

Professor Hector G. Morgan
Chair

For further enquiries please contact: efoday@health.gov.sl

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	2,3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	3,4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	3,4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	3,4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4,5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4,5
Bias	9	Describe any efforts to address potential sources of bias	4
Study size	10	Explain how the study size was arrived at	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	4
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	4,5
		(*b*) Describe any methods used to examine subgroups and interactions	4,5
		(*c*) Explain how missing data were addressed	4,5
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	4,5
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5
		(b) Give reasons for non-participation at each stage	5
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	5
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	5 (tables 1-2)

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	5,6 (tables 3-5)
		(*b*) Report category boundaries when continuous variables were categorized	5,6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	6
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	7
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	6,7
Generalisability	21	Discuss the generalisability (external validity) of the study results	6-8
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	9

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Community Knowledge, Perceptions and Practices around COVID-19 in Sierra Leone: a nationwide, cross-sectional survey

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-040328.R2
Article Type:	Original research
Date Submitted by the Author:	29-Aug-2020
Complete List of Authors:	Sengeh, Paul; FOCUS1000, Research and Evaluation Jalloh, Mohammad; FOCUS1000, Office of the Chief Executive Officer Webber, Nance; FOCUS1000, Communications Programme Ngobeh, Ibrahim; FOCUS1000, Research and Evaluation Samba, Thomas; Sierra Leone Ministry of Health and Sanitation Thomas, Harold; Sierra Leone Ministry of Health and Sanitation Nordenstedt , Helena; Karolinska Institutet, Department of Global Public Health Winters, Maike ; Karolinska Institutet, Department of Global Public Health
Primary Subject Heading:	Global health
Secondary Subject Heading:	Communication, Epidemiology, Infectious diseases, Public health
Keywords:	Public health < INFECTIOUS DISEASES, Epidemiology < TROPICAL MEDICINE, EPIDEMIOLOGY, Infection control < INFECTIOUS DISEASES, PUBLIC HEALTH

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Community Knowledge, Perceptions and Practices around COVID-19 in Sierra Leone: a nationwide, cross-sectional survey

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Word count: 3035
Abstract: 296

Abstract

Objectives To assess the public's knowledge, attitudes and practices about the novel coronavirus in Sierra Leone to inform an evidence-based communication strategy around covid-19

Design Nationwide cross-sectional Knowledge, Attitude and Practices (KAP) survey

Setting 56 randomly selected communities in all 14 districts in Sierra Leone

Participants 1253 adults aged 18 years and older of which 52% were men

Main outcome measures We calculated proportions of core indicators (awareness, knowledge, risk perception, practices). A composite variable for knowledge (based on 7 variables) was created, and categorised into low (0-2 correct), medium (3-4) and high (5-7). Predictors of knowledge were analysed with multilevel ordinal regression models. Associations between information sources, knowledge and two practices (washing hands with soap and avoiding crowds) were analysed using multilevel logistic regression models.

Results We found that 75% of the respondents felt at moderate or great risk of contracting coronavirus. A majority (70%) of women did not know you can survive covid-19, compared to 61% of men. 60% of men and 54% of women had already taken action to avoid infection with the coronavirus, mostly washing hands with soap and water (87%). Radio (73%) was the most used source for covid-19 information, followed by social media (39%). Having a medium or high level of knowledge was associated with higher odds of washing hands with soap (medium knowledge: Adjusted OR 2.1 95% CI 1.0-4.4; high knowledge AOR 4.6 95% CI 2.1-10.2) and avoiding crowds (medium knowledge AOR 2.0 95% CI 1.1-3.6, high knowledge AOR 2.3 95% CI 1.2-4.3).

Conclusions This study shows that in the context of covid-19 in Sierra Leone, there is a strong association between knowledge and practices. Because the knowledge gap differs between genders, regions, educational levels and age, it is important that messages are specifically targeted to these core audiences.

Strengths and limitations of this study

- We provide evidence and show the feasibility of a nationwide survey about covid-19 in a low-income country, to inform risk communication strategies in Sierra Leone.
- The response rate of the survey was 99%.
- The study is based on cross-sectional data, so reverse causality cannot be ruled out.

Introduction

The novel coronavirus transformed from a local outbreak into a global pandemic, resulting in millions of people around the world seeing their lives affected, with many suddenly living in quarantine. The virus knows no boundaries and quickly overwhelmed health systems in Italy and Spain in March 2020 [1] and has health authorities in many countries scrambling for health care staff, intensive care beds and personal protective equipment [2,3]. The current number of confirmed coronavirus disease 19 (covid-19) cases are an underestimation, as it only reflects the testing capacity of countries [4].

While high-income countries are struggling to contain the virus, using unprecedented measures such as strict lockdowns of the whole society, the virus has also spread to low- and middle-income countries [5]. With weaker health systems and overcrowded living conditions, measures such as physical distancing and lockdowns have a different meaning, whereby lost income, increased food prices and less access to non-covid health services can have dire consequences both in the short and in the long term [6]. In Africa, a partnership between the African Union, Africa CDC, WHO and African nations led to the formation of the Africa Taskforce for Coronavirus Preparedness and Response (AFTCOR), to support diagnostics, surveillance, infection prevention and control and communication [7]. Border closures across the world and flight restrictions form logistical problems in delivering essential goods to many African countries [8].

In Sierra Leone, memories of the devastating West-African Ebola epidemic that ravaged the country between 2014 and 2016 are still fresh in people's minds. Not only did almost 4000 people die from Ebola, it is likely that many more people died due to the collapsed health system over the course of the outbreak [9,10]. Many lessons were learned from curbing the outbreak, such as the importance of community engagement, which can potentially help in mitigating the current pandemic [11–13]. During the Ebola outbreak, radio was the most important source of information in Sierra Leone [14]. Trusted community members such as traditional and religious leaders would use radio as a platform to reach their followers, and interactive programming allowed for a dialogue between listeners and radio makers [15,16].

The current state of the pandemic is similar to the start of the Ebola outbreak in West Africa: with the lack of a vaccine or a cure, widespread behaviour change of the general public is needed to slow and stop the spread of the virus. Physical distancing and frequent hand washing are among the main actions an individual can take to prevent infection with the novel coronavirus [17,18].

As part of the preparedness for covid-19 cases in Sierra Leone, we measured the level of knowledge and uptake of preventive practices through a nationwide Knowledge, Attitudes and Practices (KAP) survey. Results formed the basis for further development and production of an evidence-based communication strategy around covid-19 in collaboration with the Ministry of Health and Sanitation (MoHS).

Methods

We administered a cross-sectional, nationwide survey in Sierra Leone between March 16-25, 2020. At the time of the survey, there were no confirmed covid-19 cases in Sierra Leone. The first lab-confirmed case in the country was reported on March 31st. We used a multi-stage cluster sampling design with primary sampling units selected with probability relative to their size. The list of around 1200 peripheral health units (PHUs) formed the sampling frame for the selection of enumeration areas. Sierra Leone is divided into 14 districts; 4 PHUs were randomly selected from each district. In each of the selected PHUs, a random sample of 25 households from the PHU's catchment population was selected and a resident aged 18 years or older was randomly selected for an interview. The households were selected using a random walk method; in the approximate centre of the sampled community a pen would be thrown in the air. The tip of the pen indicated the sampling direction. A skip interval was

determined in advance and was derived from dividing the number of estimated households in the community by the required sample size. Enumerators would walk in the direction of the tip of the pen, counting and selecting households according to the skip interval. Enumerators, wearing identity badges from the Sierra Leonean non-governmental organization FOCUS1000, explained the study to the targeted participant, after which informed consent was obtained. Enumerators were instructed to immediately stop an interview if a participant showed covid-19 symptoms or indicated during the survey to have symptoms. The enumerator would encourage the participant to seek care immediately. Consent and the further data collection were captured on 4G enabled tablets using Open Data Kit (ODK). The 14 experienced enumerators received a 2-day training before the start of the data collection, practicing the translations of the questionnaire into local languages and getting familiarised with the tablet. The multi-lingual numerators were district-based staff from FOCUS1000 and dispatched to areas that corresponded to their language skills. The study and training were organised by FOCUS1000. The target sample size of 1400 individuals was set to produce national estimates at a 95% confidence level with a margin of error of +/- 3.5%.

Whereas we did not directly include Patient and Public Involvement in the design of the study, the tools used in this survey were similar to previously deployed KAP surveys in the Ebola outbreak in Sierra Leone [14], results of which were widely disseminated during the course of the outbreak and updated based on public feedback. The survey was updated to reflect covid-19. It contained a mix of closed-ended 'yes/no' questions and open ended questions, after which the enumerator would tick the corresponding answer on a predefined list on the tablet. A composite variable was created for knowledge, based on 7 variables (see supplementary material for the full questionnaire). Three of those variables related to closed-ended questions about the modes of transmission of covid-19 (e.g. 'Can the coronavirus disease be transmitted through the air?'). A further 3 variables related to an open-ended question about the main symptoms ('What are some of the signs and symptoms of someone infected with the coronavirus disease?'), whereby the enumerator would not read the alternatives out loud, but tick the boxes that corresponded to the answers of the participants. Finally, a closed-ended question asked about the possibility of surviving covid-19. Depending on the number of correct answers, respondents could score between 0-7. The knowledge score was categorized into 0-2 correct answers (low), 3-4 (medium) and 5-7 (high). The two preventive practice questions (washing your hand with soap and water more often and avoiding crowds) were answered only by respondents who indicated that they had taken action to avoid infection with covid-19.

Statistical analysis

Due to the sampling strategy, there was an overrepresentation of the Northern and Eastern Province, this was adjusted for by using sampling weights based on population sizes of the four regions of Sierra Leone. We summarized the demographic data and calculated proportions with their 95% Confidence Intervals of the core indicators (awareness, risk perception, knowledge, practices and information sources) for the overall sample as well as by gender. Predictors of the 3-level knowledge variable were analysed using multilevel ordinal regression models, adjusted for the geographic clusters on the first level. We specified crude and models adjusted for region (North, West, South, East), gender (male/female), age (18-29, 30-39, 40-49, 50-59, 60+), education (no formal education,

primary, secondary and above) and religion (Islam/Christianity). Results were reported in Odds Ratios and their 95% Confidence Intervals. Associations with preventive practices (hand washing with soap and water and avoiding crowds) were analysed using multilevel logistic regression models, adjusted for the abovementioned covariates. Data was analysed using StataMP 15. The Sierra Leone Research and Scientific Review Committee granted ethical permission for this KAP study, see supplementary material.

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

Results

The overall response rate of the KAP survey was 99%, yielding a total sample size of 1399. Due to missing variables, 146 participants (10%) were excluded, bringing the sample size for the analysis to 1253. The distribution across the 4 regions reflect the number of districts per region; the Northern Province contains 5 districts as opposed to 2 districts in the Western Area. More than half of the sample (58%) was between 18 and 39 years old and 52% had at least secondary education, see table 1.

The awareness of the novel coronavirus was high, with 91% (95% Confidence Interval (CI) 88.2% - 93.2%) indicating that they had heard of covid-19 (table 2). 75% (95% CI 64.7 - 82.5%) of the sample felt at moderate or great risk of contracting the virus in the next 6 months, but this varied greatly across regions; 96% in the Eastern province felt at moderate or high risk compared to 58% in the Western Area (where capital Freetown is located). Knowledge about how the virus spreads was relatively high (61%-74%), however knowledge about important symptoms of covid-19 such as difficulty breathing was relatively low (33%, 95% CI 24.8% - 41.9%). Only 35% (95% CI 28.5% - 41.3%) knew that you can survive covid-19. This differed significantly by gender, whereby more men (39%, 95% CI 31.7% - 46.9%) knew about covid-19 survival than women (30%, 95% CI 23.8% to 36.5%), see supplementary material. A bit more than half of the respondents (57%, 95% CI 50.9% - 63.0%) said they have already taken action to avoid covid-19 infection. More men than women reported doing so (men: 60%, 95% CI 52.9% - 66.4% vs women: 54% 95% CI 47.4% - 60.6%). The most commonly mentioned action taken was washing hands with soap and water more often (87%, 95% CI 81.9% - 90.5%). Radio (73%, 95% CI 69.2% - 77.2%) was the most used source for covid-19 information, followed by social media (39%, 95% CI 31.4% - 46.%3). Social media use was significantly more common by men (45%, 95% CI 37.9% - 52.9%) than by women (31%, 95% CI 23.6% - 39.9%). Print media (11%, 95% CI 5.9% - 18.3%) and traditional leaders (9%, 95% CI 4.4% - 17.2%) were the least commonly reported sources of covid-19 information. 93% of respondents indicated that they would like to have more information on covid-19, mostly about signs and symptoms of the disease and ways to prevent it.

Respondents who felt at moderate or high risk of contracting covid-19 were more likely to have a higher level of knowledge (Adjusted Odds Ratio (AOR) 2.82 95% CI 1.84-4.32), see table 3. Those living in the Northern and Southern Province were more likely to have more knowledge about the novel coronavirus. Men were 45% (95% CI 1.13-1.86) more likely than women to demonstrate knowledge. Respondents who attained at least secondary education

were 3 times more likely (95% CI 2.22-4.22) than respondents with no formal education to have more knowledge about covid-19.

Respondents who had a medium level of knowledge about the novel coronavirus were 2 times more likely to say that they wash their hands with water and soap more often (AOR 2.10 95% CI 1.00-4.39); those with a high level of knowledge were more than 4 times more likely to say so (AOR 4.60 95% CI 2.08-10.18), see table 4. A similar pattern can be observed for the association between knowledge and the self-reported practice of avoiding crowds. Having a medium or high level of knowledge was associated with avoiding crowds (medium knowledge: AOR 1.95 95% CI 1.07-3.57, high knowledge: AOR 2.30 95% CI 1.23-4.30).

All information sources, apart from community meetings were associated with increased knowledge about covid-19, see table 5. However, only radio was significantly associated with a higher likelihood of reporting more frequent hand washing with water and soap (AOR 2.64 95% CI 1.40-4.95). Three information sources were associated with avoiding crowds; social media (AOR 1.90 95% CI 1.20-3.01), print media (AOR 3.52 95% CI 1.57-7.90) and the Ministry of Health and Sanitation (AOR 2.88 95% CI 1.28-6.47).

Discussion

This cross-sectional nationwide survey in Sierra Leone gives insights in the knowledge, attitudes and practices around covid-19. Whereas at the time of the study there were no confirmed cases in Sierra Leone, awareness of covid-19 was high – likely due to the ongoing worldwide health emergency. There was a strong demand for more information among the respondents. We found strong associations between increased knowledge and important preventive practices such as frequent hand washing with soap and water and avoiding crowds. Significant gender differences in knowledge and taking preventive actions indicate that outbreak communication should specifically target women, as well as those with lower educational levels. Furthermore, the Southern Province differed significantly from the other provinces in terms of their level of knowledge about covid-19. It can be speculated that this difference might be due the relatively high exposure to media (such as radio and mobile phones) in the Southern Province and the presence of a university, which might have brought more awareness to the ongoing pandemic [19].

The results of this study were used to upgrade the communication strategies of the MoHS and national organizations in Sierra Leone. Key messages targeting women, young people and across various platforms are currently being developed. Use of mass media is intensified and trusted leaders such as religious leaders and traditional healers are engaged to disseminate standardized messages. Measures are developed to track and debunk rumours, especially via social media.

The perception of risk of contracting covid-19 was relatively high – higher than reported in a similar KAP survey during the first months of the Ebola outbreak, when 58% felt at risk of contracting Ebola [14]. Whereas Ebola's mortality rate is estimated to be around 50% among confirmed cases [20], covid-19 has a much lower case fatality rate of around 4.1% [21]. Given the substantial underreporting of covid-19 cases, the true infection fatality rate is likely much lower. The ongoing pandemic elsewhere in the world and the memories of the devastating Ebola outbreak have likely exacerbated the perception of risk [22]. The finding

that only 35% of the respondents knew that you can survive covid-19, shows that more sensitization needs to be done so that risk perceptions reflect the actual risk. For instance, messages could highlight that older age groups (70 years and older) are most at risk of experiencing a severe form of covid-19 and of dying from the disease [23]. While in many European countries the share of those aged 70 and older is between 15-20% [24], in Sierra Leone only 2.4% of the population is older than 70 [25]. Exact age-specific mortality rates of covid-19 are to date not confirmed but are significantly lower than Ebola [26,27].

Radio has throughout the Ebola outbreak been an important source of information [14,28]. In our study, radio is similarly the most cited source of information. Community sources such as religious and traditional leaders were mentioned by only 10% of the sample, which is low compared to the Ebola outbreak when 60% heard messages through community leaders [28]. This can be explained by the timing of our survey; sensitisation and community engagement efforts were just starting. Community leaders remain trusted sources of information in Sierra Leone and should be mobilised for community engagement [29].

Social media on the other hand was also a relatively frequently mentioned source in our study. WhatsApp is an especially widespread social media platform in many African countries [30]. In our study, social media was strongly associated with increased knowledge and with avoiding crowds. Whereas it can clearly be a source of relevant information, there is also reportedly widespread misinformation circulating quickly on WhatsApp [31]. We have not studied misconceptions and risk behaviour further, which are likely to be associated with social media. Monitoring and frequent updates on social media should be a priority in any communication strategy [32]. Radio and social media provide platforms that could be leveraged to disseminate important information [33].

While a little more than half of the respondents indicated that they had already taken actions to avoid covid-19 infection, the feasibility of (long-term) preventive practices in low-income settings should be taken into account [34]. Physical distancing in overcrowded communities can be very challenging. Most deprived communities lack running water, toilet facilities, soap and basic food items. It is not uncommon to find a family of 4-5 people cramped in a single bedroom with poor lighting and ventilation [35]. Promoting physical distancing should be aligned with the on-the-ground reality. Increasing public education, especially on the use of face masks and the provision of water and soap might be the most realistic measure to take.

Strengths & limitations

Major strengths of this study are the nationwide sample and high response rate. This study shows that rapid data collection can be done in preparation for a health emergency and can form the basis of evidence-based decision making. This is a cross-sectional survey, so associations can also be interpreted in the opposite direction. The sampling strategy (using PHUs as the sampling frame), caused oversampling of some regions compared to population size, which was adjusted for by applying sampling weights. Still, the data may not have been representative of the population. Social desirability might have influenced the answers of respondents. Respondents might have highlighted preventive practices that they were familiar with from the Ebola outbreak – which might make the implementation of public health measures quicker. Despite extensive practice of the translations of the English

questionnaire to local languages, the translations in practice might not have been fully consistent. Lastly, self-reported practices might be different from actual practices.

Conclusion

In Sierra Leone, where a devastating Ebola outbreak ended over 4 years ago, we found that while awareness and risk perception of covid-19 was high, the majority does not know that one can survive covid-19. While knowledge does not automatically translate into practices, this study shows that in the context of covid-19 in Sierra Leone, there is a strong association between knowledge and practices. Although we cannot rule out reverse causality, this points to the importance of community engagement and risk communication. Because the knowledge gap differs between genders, regions, educational levels and age, it is important that messages are specifically targeted to these core audiences. Information platforms with a wide reach, such as radio and social media, should be leveraged to disseminate messages by trusted leaders.

Contributors

PS, MBJ, NW, IN, TS, HT led the conception and design of the survey. PS, MBJ, NW, IN contributed to the training and supervision of the data collection teams. MW led the data analysis with support from PS and HN. All co-authors contributed to the interpretation of the results. PS, HN, MW contributed to the writing of the manuscript. All co-authors read and approved the manuscript.

Data sharing

All requests to access the data must be processed through the multipartner data sharing mechanism. All data accessibility requests should be directed to the corresponding author: maike.winters@ki.se

Role of the funding source

There was no external funding.

Conflict of Interest

The authors declare no conflict of interest

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Table 1 Demographics

	Eastern Province	Northern Province	Southern Province	Western Area	Total
Sex					
Female	133 (47)	221 (47)	181 (52)	89 (47)	604 (48)
Male	127 (53)	254 (53)	165 (48)	102 (53)	648 (52)
Age (years)					
<20	27 (11)	43 (9)	41 (12)	13 (7)	124 (10)
20-29	55 (23)	138 (29)	58 (17)	66 (35)	317 (25)
30-39	57 (24)	117 (25)	69 (20)	50 (26)	293 (23)
40-49	46 (19)	83 (17)	57 (16)	36 (19)	222 (18)
50-59	26 (11)	62 (13)	48 (14)	16 (8)	152 (12)
>=60	28 (12)	32 (7)	73 (21)	10 (5)	143 (11)
Education					
No formal	79 (33)	154 (32)	131 (38)	40 (21)	404 (32)
Primary	39 (16)	58 (12)	73 (21)	19 (10)	189 (15)
Secondary	120 (50)	263 (55)	140 (41)	132 (69)	655 (52)
Religion					
Islam	145 (61)	378 (80)	229 (66)	91 (48)	843 (67)
Christianity	94 (39)	97 (20)	117 (34)	100 (52)	408 (33)

Table 2. Covid-19 awareness, knowledge, practices and information sources

Indicator	**%***	**95% CI***
Awareness & attitudes		
Heard of covid-19	91	88.2 to 93.2
Moderate – great risk perception	75	64.7 to 82.5
Knowledge		
Mode of transmission: air	61	54.6 to 66.1
Mode of transmission: body fluids	74	68.3 to 78.8
Mode of transmission: touch	66	59.4 to 71.2
Symptoms: fever	38	30.0 to 46.4
Symptoms: cough	54	47.5 to 61.3
Symptoms: difficulty breathing	33	24.8 to 41.9
Possible to survive covid-19	35	28.5 to 41.3
Practices		
Taken any action	57	50.9 to 63.0
Wash hands with soap & water	87	81.9 to 90.5
Avoid crowded places	62	53.7 to 69.0
Drink traditional herbs	9	3.7 to 21.6
Medicines from pharmacy	10	4.0 to 22.1

Drink a lot of water / juice	22	14.0 to 31.8
Information sources		
Social media	39	31.4 to 46.3
Radio	73	69.2 to 77.2
Church/Mosque	24	17.3 to 31.7
Community meetings	18	11.8 to 26.7
Print media	11	5.9 to 18.3
Traditional leaders	9	4.4 to 17.2
Ministry of Health and Sanitation	13	7.5 to 20.6
*Adjusted for sampling weights		

Table 3 Predictors of covid-19 knowledge

	Crude OR (95% CI)	p-value	Adjusted* OR (95% CI)	p-value
Risk perception				
No & small	Reference	-	Reference	-
Moderate & great	3.56 (2.04-6.25)	0.000	2.82 (1.84-4.32)	0.000
Region				
East	Reference	-	Reference	-
North	3.54 (1.14-10.96)	0.029	3.05 (1.05-8.86)	0.040
South	7.78 (2.71-22.30)	0.000	10.84 (3.52-33.39)	0.000
Western	4.14 (1.99-8.62)	0.000	3.65 (0.89-14.98)	0.072
Sex				
Female	Reference	-	Reference	-
Male	1.65 (1.27-2.14)	0.000	1.45 (1.13-1.86)	0.003
Age				
18-29	Reference	-	Reference	-
30-39	0.96 (0.66-1.39)	0.808	1.42 (1.02-1.99)	0.040
40-49	0.89 (0.58-1.38)	0.605	1.45 (1.01-2.09)	0.043
50-59	0.67 (0.40-1.11)	0.119	1.06 (0.70-1.62)	0.774
>60	0.57 (0.32-1.00)	0.051	0.80 (0.51-1.23)	0.298
Education				
No formal	Reference	-	Reference	-
Primary	1.78 (1.00-3.18)	0.050	1.39 (0.95-2.03)	0.090
Secondary	3.32 (2.11-5.21)	0.000	3.06 (2.22-4.22)	0.000
Religion				
Islam	Reference	-	Reference	-
Christianity	1.77 (1.24-2.52)	0.002	1.38 (1.02-1.85)	0.035
*Adjusted for: risk perception, region, sex, age, education, religion				

Table 4 Association between knowledge and practices

	Handwashing			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Knowledge				
Low	Reference	-	Reference	-
Medium	1.84 (0.91-3.73)	0.089	2.10 (1.00-4.39)	0.049
High	4.63 (2.18-9.84)	0.000	4.60 (2.08-10.18)	0.000
	Avoiding crowds			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Knowledge				
Low	Reference	-	Reference	-
Medium	1.86 (1.03-3.36)	0.039	1.95 (1.07-3.57)	0.030
High	2.21 (1.21-4.02)	0.010	2.30 (1.23-4.30)	0.009
*Adjusted for: region, sex, age, education, religion				

Table 5 Association between information sources and knowledge and preventive practices

	Knowledge			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	3.78 (2.66-5.38)	0.000	2.97 (2.12-4.16)	0.000
Radio	1.93 (1.40-2.66)	0.000	1.75 (1.26-2.43)	0.001
Church / Mosque	1.72 (1.21-2.44)	0.003	1.87 (1.30-2.70)	0.001
Community meetings	1.41 (0.89-2.34)	0.144	1.53 (0.95-2.48)	0.080
Print media	2.79 (1.42-5.47)	0.004	2.63 (1.34-5.17)	0.006
Traditional leaders	1.98 (1.17-3.35)	0.012	2.04 (1.13-3.70)	0.019
MoHS	3.09 (1.84-5.19)	0.000	3.13 (1.85-5.30)	0.000
	Hand washing			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	1.03 (0.55-1.93)	0.935	0.79 (0.37-1.68)	0.537

Radio	2.72 (1.46-5.05)	0.002	2.64 (1.40-4.95)	0.003
Church / Mosque	1.88 (0.87-4.07)	0.108	1.76 (0.83-3.71)	0.135
Community meetings	2.73 (1.23-6.05)	0.015	2.03 (0.85-4.90)	0.110
Print media	3.54 (0.80-15.68)	0.094	2.91 (0.62-13.60)	0.171
Traditional leaders	1.66 (0.49-5.68)	0.411	1.58 (0.52-4.85)	0.415
MoHS	2.26 (0.71-7.18)	0.164	1.96 (0.55-6.96)	0.289
	Avoiding crowds			
	Crude OR (95% CI)	**p-value**	**Adjusted* OR (95% CI)**	**p-value**
Information sources				
Social media	1.65 (1.04-2.60)	0.032	1.90 (1.20-3.01)	0.007
Radio	1.64 (1.02-2.65)	0.042	1.59 (0.97-2.61)	0.064
Church / Mosque	1.69 (0.93-3.04)	0.082	1.62 (0.88-2.98)	0.117
Community meetings	1.49 (0.82-2.70)	0.191	1.56 (0.84-2.91)	0.156
Print media	3.29 (1.55-6.99)	0.002	3.52 (1.57-7.90)	0.003
Traditional leaders	3.21 (0.91-11.30)	0.068	3.33 (0.87-12.71)	0.077
MoHS	2.70 (1.27-5.76)	0.011	2.88 (1.28-6.47)	0.011
*Adjusted for: risk perception, region, sex, age, education, religion				

Supplementary Material

Community Knowledge, Perceptions and Practices around COVID-19 in Sierra Leone: a nationwide, cross-sectional survey

S1: Core indicators by gender

Indicator	Sex	
	Male % (95% CI)	Female % (95% CI)
Moderate – great risk perception	75 (66.6 to 82.6)	74 (61.6 to 82.9)
Knowledge		
Mode of transmission: air	63 (55.1 to 69.5)	58 (52.6 to 63.7)
Mode of transmission: body fluids	77 (71.0 to 81.9)	71 (64.5 to 76.2)
Mode of transmission: touch	67 (59.4 to 74.0)	64 (57.5 to 70.9)
Symptoms: fever	39 (31.2 to 47.1)	37 (27.7 to 46.9)
Symptoms: cough	56 (49.0 to 62.3)	53 (44.4 to 61.5)
Symptoms: difficulty breathing	34 (26.1 to 43.3)	31 (22.6 to 41.4)
Possible to survive covid-19	39 (31.7 to 46.9) *	30 (23.8 to 36.5)*
Practices		
Taken any action	60 (52.9 to 66.4)*	54 (47.4 to 60.6)*
Wash hands with soap & water	87 (82.1 to 91.1)	86 (79.6 to 90.8)
Avoid crowded places	61 (52.9 to 69.1)	62 (52.8 to 70.7)
Drink traditional herbs	10 (4.0 to 22.4)	9 (3.1 to 21.6)
Medicines from pharmacy	10 (4.3 to 22.7)	9 (3.5 to 22.0)
Drink a lot of water / juice	21 (13.4 to 32.4)	22 (14.1 to 32.2)
Information sources		
Social media	45 (37.9 to 52.9)*	31 (23.6 to 39.9)*
Radio	74 (69.7 to 78.7)	72 (66.9 to 77.0)
Church/Mosque	23 (17.0 to 30.2)	25 (17.0 to 34.4)
Community meetings	18 (12.2 to 26.1)	18 (10.8 to 28.2)

Print media	10 (5.9 to 17.0)	11 (5.6 to 20.4)
Traditional leaders	8 (4.3 to 15.4)	10 (4.3 to 19.8)
Ministry of Health and Sanitation	11 (6.8 to 18.6)	14 (7.8 to 23.5)
** Chi2 <0.05 All proportions are adjusted for sampling weights		

Consent Statement

Hello. My name is _____.

I am working with FOCUS 1000 – an NGO in Sierra Leone that works to improve the health of children, women, and their communities. We are conducting a quick assessment of the public's perceptions, knowledge, attitudes, and behaviours, relating to the prevention of Coronavirus disease (COVID-19). The information we collect will help us, the Government of Sierra Leone, Development Partners, and civil society organizations better educate the public about how to effectively prevent the transmission of the disease.

The interview will take about 20 minutes. All of the information you share with us will be kept confidential – meaning that we will not link your name in any reports or identify you as the respondent in any other way. Your participation in this study is voluntary, and you will not be paid. You may choose to stop the interview at any point or refuse to answer questions you do not feel comfortable responding to. There are no right or wrong responses. Therefore, we encourage you to be honest and truthful in your responses so that we can accurately understand the current situation on-the-ground.

ASK TO RESPONDENT:

- Do you have any questions?
- Do I have your permission to continue with the interview?

1. YES I AGREE → Continue with interview

2. NO I DECLINE → END interview; respectfully thank participant for their time

By signing below, I attest that I have read the above statement to the participant and he/she has agreed to continue with the interview. I have also addressed all of his/her questions and/or concerns.

SIGNATURE OF INTERVIEWER: ……

DATE (Day, Month, Year): /____/____/____/

QUESTIONNAIRE

Enumerator Identification

Enumerator ID:	Supervisor Initials (QA/QC):

District and Chiefdom Identification

Western Area _____ Western Rural _____ Western Urban **Northern Province** _____ Bombali _____ Falaba _____Koinadugu _____ Tonkolili **North Western Province** _____ Kambia _____Karina _____Port Loko _____ **Eastern Province** _____ Kailahun _____ Kenema _____ Kono **Southern Province** _____ Bo _____ Bonthe _____ Moyamba _____ Pujehun	**Name of Community** _____ **Household #:**_____ _____ **Household size**:_____ _____

1. **Have you heard of the Coronavirus disease (COVID-19) before** (prior to this interview)**?**
   a. Yes
   b. No (if selected, end survey here)
   c. No response
2. If yes, **through what means/ways did you learn about the Coronavirus disease (COVID-19)? (select all applicable choices)**
   a. Radio (FM 98.1, AYV radio, SLBC Morning Coffee, Television
   b. Megaphone public announcements
   c. Social media (SMS, WhatsApp, Internet, Blog, Website, Facebook, Twitter, etc.)
   d. Church / Mosque / other religious venues
   e. Other community meetings
   f. Civil Society Organizations (FOCUS 1000, etc.)
   g. Newspaper / Flyers / Brochures / Other print materials
   h. Traditional leaders (chief, village headman, etc.)
   i. Ministry of Health and Sanitation / Well Bodi Ministry and other gov't MDAs
   j. Community health workers (CHWs)
   k. From family members or friends
   l. Others_____
   m. I don't know / not sure
   n. No Response

RISK PERCEPTION

3. **What level of risk do you think you have in getting Coronavirus disease (COVID-19) in the next 6 months? (read choices; select one)**
   a. No risk —> GO TO Q6
   b. Small risk
   c. Moderate risk
   d. Great risk
   e. I don't know / not sure
   f. No Response

4. **Why do you believe that you are at risk? (select all applicable choices; DO NOT read)**
   a. I have been experiencing signs and symptoms of Coronavirus disease (COVID-19) since _____ day(s) ago
      (if so: stop the interview, recommend that the person goes to the nearest health facility to check the health status for possible case of Coronavirus disease (COVID-19)
   b. I have not been keeping well lately
   c. I was already affected by EVD and not been keeping well since
   d. I have other challenging health conditions (HIV, Diabetes, hypertension, etc.)
   e. The disease is in over xx countries and already in West Africa
   f. A lot of Salone traders go to China, Chinese go back and forth from this country, we have students returning from there

g. Others_____
h. I don't know / not sure
i. No Response

GO TO → Q7

5. **Why do you believe that you are NOT at risk? (select all applicable choices; DO NOT read)**
   a. I do not eat or hunt bush meat or bats
   b. I am a clean person / Coronavirus disease (COVID-19) only affects unclean people
   c. I don't live in an area where there is Coronavirus disease (COVID-19)
   d. I don't come in contact with someone with Coronavirus disease (COVID-19)
   e. God is protecting me
   f. I avoid unprotected contact with bodily fluids
   g. I wash my hands with soap or other disinfectants
   h. I did not get EVD the last time
   i. Others_____
   j. I don't know / not sure/
   k. No Response

KNOWLEDGE / ATTITUDES

6. **What causes the Coronavirus disease (COVID-19)? (select all applicable choices; DO NOT read)**
   a. Virus
   b. Bats / Monkeys / Chimpanzees / Other wild animals
   c. God or higher power
   d. Witchcraft
   e. Evildoing / Sin
   f. Curse
   g. Others _____
   h. I don't know/ not sure
   i. No Response

7. **How does a person get the Coronavirus disease (COVID-19)? (select all applicable choices; DO NOT read)**
   a. By air
   b. Bad odor or smell
   c. Preparing bush meat as a meal (such as chimpanzees, monkeys, and other wild animals)
   d. Eating bush meat
   e. Saliva or cough of an infected person
   f. Body fluids of an infected person
   g. Feces of an infected person
   h. Shaking the hands of an infected person
   i. Other physical contact with an infected person

j. God's will
k. Witchcraft
l. Making contact with anything someone sick with Coronavirus disease (COVID-19) has touched
m. Others _____
n. I don't know / not sure
o. No Response

8. Can the Coronavirus disease (COVID-19) be transmitted through the air?

a. Yes
b. No
c. I don't know / not sure
d. No Response

9. Can I prevent myself from getting the Coronavirus disease (COVID-19) by avoiding contact with blood and body fluids (cough, saliva, sweat, tears, runny nose)?

a. Yes
b. No
c. I don't know / not sure
d. No Response

10. Can people help protect themselves from the Coronavirus disease (COVID-19) by not touching anyone else?

a. Yes
b. No
c. I don't know / not sure
d. No Response

11. What are some of the signs and symptoms of someone infected with the Coronavirus disease (COVID-19)? (select all applicable choices; DO NOT read)

a. Any Fever
b. Sweat
c. Sudden onset of high fever
d. Severe headache
e. Persistent cough
f. Sore throat
g. Rash
h. Difficulty breathing
i. Others_____
j. I don't know / not sure
k. No Response

12. Do you know or have you heard that it is possible for someone to survive and recover from Coronavirus disease (COVID-19)?

a. Yes
b. No
c. I don't know / not sure
d. No Response

13. If a person has a suspected Coronavirus disease (COVID-19) does he/she have a higher chance of survival if he/she goes immediately to a Health Facility?

a. Yes
b. No
c. I don't know / not sure
d. No Response

14. If a person with the Coronavirus disease (COVID-19) goes immediately to a Health Facility will he/she reduce the chance of spreading it to other family members, work colleagues or friends?

a. Yes
b. No
c. I don't know / not sure
d. No Response

15. Would you like to have more information on the Coronavirus disease (COVID-19)?

a. Yes
b. No → Q22
c. I don't know / not sure
d. No Response

16. What area(s) do you need additional information on? (select all applicable choices; DO NOT read)

a. Cause / origin of the disease
b. Signs and symptoms of the disease
c. Ways to prevent the disease
d. Medical care and treatment options for those with the disease
e. Home-based care for someone who is sick and suspected to have Coronavirus disease (COVID-19)
f. How to protect others in the house if a household member is suspected of the Coronavirus disease (COVID-19)
g. Support and care for those quarantined to their houses because they have been exposed to Coronavirus disease (COVID-19)

h. Support and care for those quarantined in health facilities because they have been exposed to the Coronavirus disease (COVID-19)
i.
j. Others_____
k. I don't know / not sure
l. No Response

BEHAVIOUR

17. Since you heard of the Coronavirus disease (COVID-19), have you taken any action to avoid being infected?

a. Yes
b. No →22
c. I don't know / can't remember →22
d. No Response→22

18. In what ways have you changed your behavior or taken actions to avoid being infected? (select all applicable choices; DO NOT read)

a. I wash my hands with soap and water more often
b. I wash my hands with just water more often
c. I clean my hands with other disinfectants more often
d. I try to avoid crowded places
e. I drink a lot of water / juice
f. I drink traditional herbs (e.g. gbangbah)
g. I take medicines from pharmacies
h. I have bought and I am using face masks

20. If a family member became sick and died tomorrow, would you touch or wash the dead body?

a. Yes
b. No
c. I don't know
d. No response

21. If a family member dies of the Coronavirus disease (COVID-19), would you touch or wash the dead body?

a. Yes
b. No
c. I don't know
d. No response

SOCIO-DEMOGRAPHIC

22. Gender _____Male Female_____

23. **Age:**_____ years

24. **What is you highest level of education?**
    a. No formal education
    b. Some primary school
    c. Completed primary school
    d. Completed Junior Secondary School (JSS)
    e. Completed Senior Secondary School (SSS)
    f. Completed Diploma / Postsecondary Training
    g. Completed Bachelors
    h. Completed Masters / Doctorate
    i. No Response

25. **What kind of work do you currently do?**
    a. Private business (excluding petty traders)
    b. Plumber / Carpenter / Electrician
    c. Petty Trader
    d. Farmer
    e. Teacher / lecturer /Instructor
    f. Public transportation driver (taxi, buses, podapoda)
    g. Okada rider
    h. Medical or health professional
    i. Other Government employee (not already listed above)
    j. Student
    k. Unemployed
    l. No Response

26. **What is your religion?**
    a. Islam
    b. Christianity
    c. Other_____
    d. I don't hold any religious beliefs
    e. No Response

CLOSING SCRIPT

- Thank you for taking the time to discuss these important issues with me.
- Again, please be rest assured that your responses will be kept confidential.
- Your name or any other identifiers of your family or household will not be included in the report.
- The responses you have provided would help in improving social mobilization efforts aiming to help contain the Coronavirus disease (COVID-19) epidemic in Sierra Leone
- Once again, thank you very much.

DO YOU HAVE ANY QUESTIONS FOR ME?

If you have additional questions, please contact FOCUS 1000
Name: Mr. Paul A. Sengeh

Phone number: 076626543

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	2,3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	3,4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	3,4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	3,4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4,5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4,5
Bias	9	Describe any efforts to address potential sources of bias	4
Study size	10	Explain how the study size was arrived at	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	4
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	4,5
		(*b*) Describe any methods used to examine subgroups and interactions	4,5
		(*c*) Explain how missing data were addressed	4,5
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	4,5
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5
		(b) Give reasons for non-participation at each stage	5
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	5
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	5 (tables 1-2)

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	5,6 (tables 3-5)
		(*b*) Report category boundaries when continuous variables were categorized	5,6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	6
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	7
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	6,7
Generalisability	21	Discuss the generalisability (external validity) of the study results	6-8
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	9

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.